COMUNICARE ÎN SPRIJINUL SUSTENABILITĂȚII

Diagnoză, intervenție și experiență transformatoare
într-un campus studențesc

COMMUNICATING SUSTAINABILITY

Diagnosis, intervention, and transformative
experiences on a student campus

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TRITONIC
Tritonic Books
București – 2024

TABLE OF CONTENTS

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FOREWORD

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"Our biggest challenge in this new century is to take an idea that seems abstract – sustainable development – and turn it into a reality for all the world's people."

– Kofi Annan, Former United Nations Secretary-General

The undertaking of sustainability and sustainable development as a priority policy of the university is announced in the strategic plan for the 2024–2029 mandate. The concept of sustainability that we want to implement at the university level addresses a comprehensive approach, which aims to achieve the sustainability indicators provided by international rankings, to develop human resources in accordance with the needs of society and the trends of the economic market, to guide administrative activities in accordance with the objectives of sustainable development, to create a safe space that encourages the "green" initiatives of members of the academic community, but also of external partners, such as local and regional institutions or companies.

The year 2023, which marked the 100th anniversary since the inauguration of the first building built and owned by the university, was a good opportunity to rethink the entire campus of the Politehnica University Timisoara and transform it in accordance with the principles of urban sustainability. The idea of a smart green campus of the future appeared even before the beginning of the year when Timisoara was one of the European Capitals of Culture. At the time students from Politehnica's Faculty of Architecture and City Planning came up with a new vision for campus development, in tune with today's youth aspirations. The urbanism project establishes two fundamental transversal directions, through the "smart" and "green" themes, required to be applied to each proposal. The proposals target interventions at the level of the entire campus, including the dormitories' area.

We currently have several projects underway aimed at modernizing the UPT campus. One of them deals with the installation of a photovoltaic system for 17 buildings of Politehnica University Timisoara, with an installed power of 1.5 MWh, 1.8 million euros worth, financed through a project supported by Ministry of Energy funds. The respective buildings will ensure the renewable electricity production needed to cover the consumption needs of the campus. Another project, financed by the National Recovery and Resilience Plan (PNRR), aims at the complete modernization of two student dormitories, through interior remodeling, increasing the living space, transforming the rooms into apartment-type modules consisting of two rooms, two bathrooms and a kitchenette, modernizing the HVAC installation systems (Heating, Ventilation and Air Conditioning) and electrical installations, restoring the heating system in order to reduce energy consumption and installing renewable energy sources. At the same time, in the heart of the campus, the works on the tribune of the „Science" Stadium are being carried out at a sustained pace, the future tribune also being designed with a multi-storey car park, which represents a first stage in the long-term plan to transform the campus into a completely pedestrian space meant to meet the current needs of the community.

In addition to the investments in the physical infrastructure, Politehnica University Timisoara emphasizes the importance of lifelong education, creating tools to facilitate learning (informal and non-formal) also outside the classrooms. Against this background, the UPT Creative Campus program emerged, a platform that lays the foundation for social, cultural, and urban regeneration, the campus thus becoming a space of innovation and creativity, where young people create their own identity in the structure of the city.

We address, therefore, the process of transforming the campus as a whole and encourage projects such as University Students Engaging in Responsible and Sustainable Energy Consumption (USE-REC), concerned with changing mentalities and strengthening pro-active behaviors to save the environment. Through its educational programs, through theoretical and applied research, through its commitment to the life of the city, the region, even the country, the Politehnica University Timisoara is at the vanguard of systemic changes towards sustainability, which is urgently needed in the 21st century. We support the culture of learning, critical thinking and curiosity, we encourage scientific and applied initiatives, as the one presented by the project described in this volume, and we are convinced that those who will have the curiosity to travel, together with the authors, the journey of knowledge, they will find sources of inspiration for new projects promoting sustainability.

1. UNIVERSITY CAMPUS - A "CITY WITHIN A CITY"

Mariana Cernicova-Bucă

The university as a reality of the modern world has a millennial history. There are historians that trace the roots of the idea of university back to the schools of antiquity (Peters, 2019). However, for what today we recognize as the institution capable of transforming, through a sustained and long-lasting educational approach, an ordinary person into a professional with skills, knowledge and self-awareness, the traceable history of the university starts with Bologna, in 1088 (Verger, 2019; Rüegg, 2011). The debates on the multiple changes that the university has experienced throughout its evolution are fascinating, reflecting society's visions of this unique institution through the effects it has on the existence of the community to which it is addressed. In the 21st century, the overwhelming majority of countries in the world have a higher education system, with at least one university (Valero and Van Reenan, 2019).

The university is referred to in association with metaphors or epithets to signal current perceptions of the institution: "ivory tower" (Etzkowitz et al., 2000), entrepreneurial university (Clark, 2004), student-centered university (Wright, 2011), postmodern university (Aviram, 2010; Barnett, 2010). Peter Drucker even predicted the "death of the university" (Marmolejo et al., 2007), starting from what French sociologists call the „demonetization" of diplomas (Millet and Moreau, 2011) or from the democratization of the access to highly qualified professions by breaking the monopoly held by universities on training specialists and transferring vocational training to other types of skills providers. The debates lead, to the limit, to the dismantling of the term "university" through a big-bang-like evolution, to replace uniqueness with something that would be called "multi-versity" (Kerr, 1963; Krücken et al. 2007) or even "omniversity" (Bassett, 2021; Goetze, 2021). Beyond the mentioned controversies, beyond the attempts to define or redefine what a higher education institution means today, universities remain a constant of the societal environment, possessing the incredible capacity to simultaneously address the immediate and concrete needs of society, but also humanity's projection of a distant future, marked by progress and innovation (Boulton and Lucas, 2011).

Regardless of the manner in which they came into being, of their profile or their anchoring on the globe, universities are made up of three interdependent parts, as Martin Wilhelm and Judith Elbe admirably define, speaking about the future of the university campus (Jensen, 2009): the educational and research institution (with its departments, employer and representatives), the academic community (made up of students, professors and administrative staff) and the university spaces as "habitats of university members", with their built manifestation. The development (and management) of the university requires an integrated approach of all three components. Even when the institutions are decoupled from their physical materiality, university space – including in its virtual forms – represents a legitimate subject of study. In this space (which is wider than its geographical borders) a miracle occurs: new knowledge and innovation appear, generations of specialists are formed in a multitude of fields, capable of contributing to social development. This university space is designated by a word that, at least for now, is less controversial than "university": "campus".

The notion of campus associated with academic life entered Romania after 1990, through the influence of literature specialized on higher education in Europe and, especially, in the United States. The dictionary definition explains the word as referring to a "university complex comprising buildings and facilities for education, research, housing, leisure, etc." We owe to Paul Venable Turner the attestation of today's meaning for "campus" as the territory on which university buildings are located. He identifies the use of the term in the American university sphere in the 18th century (Turner, 1984). Turner also talks about the campus as a community that can be understood as "a city in a microcosm", understanding by this not only the urban essence of the university campus, but also the relationship between the inhabitants of this unique space, which leads to the transmission of knowledge from one generation to another and to the production of new knowledge. Continuing this idea, Scholl and Gulwadi (Scholl and Gulwadi, 2015) propose that campuses, including green spaces between buildings, are entities to be approached holistically. They are "learning spaces" on multiple levels of interaction between people, between people, on the one hand, and the natural and built environment, on the other, respectively between visible and invisible networks that are structured at the university campus level.

As a form of organization, the campus is presented as a "city within a city" – with different possible configurations, from an area surrounded by walls, such as a monastery protected from the intrusion of the outside world to open space, interwoven into the structure of the host city, with which it alternates in mosaic and fluid ways (Den Hejder and Curvelo Magdaniel, 2018). The relations between campus and city encounter multiple variations, depending on the geographical area.

In the United States of America, for instance, there were universities that preceded the existence of a city. The urban community was built later, complementary to the academic institution, as it was the case at Harvard, Princeton, or Berkley (Wilhelm and Elbe, in Jensen 2019). In Asia, cities superimposed on the university campus, in a technological cluster, have been developed (Den Heijer and Curvelo Magdaniel, 2018). The best-known models in Europe, however, are variants in which campuses and cities have numerous points of contact and overlapping, even if the academic area is located on the periphery or has natural or built dividing barriers (Jensen, 2009). The university is – and, as Ortega y Gasset put it – must be "open to the whole reality of its time", that is, to participate in the life of society "as a university", as an entity with specific valences, potential and uniqueness (Ortega y Gasset, 2010, p. 76).

University-city relations are evolutionary and complex (Brennan and Cochrane, 2019), but the presence of a university in the city is associated with dynamism, attractiveness, economic competitiveness, and vitality (Glückler et al., 2019; Valero and Van Reenan, 2019; Curvelo Magdaniel 2013; Harris and Holley, 2016; Pastor et al., 2012; Trani and Holsworth, 2010). Moreover, the presence of a university confers prestige and increases the visibility of a city. The anticipation of such impacts led, in 1990–2020 Romania, to the doubling of the number of higher education institutions compared to the period 1980–1990 (Cernicova-Bucă, 2010). Of course, the desire of local communities in key Romanian cities to attract the socio-economic benefits of university presence was not the sole factor driving this growth. The change in society's conception regarding access to education, the requirement for new specializations, the harmonization with the European system, etc. also played significant roles (Millet and Moreau, 2011; Florea and Wells, 2011).

In the motivation letters submitted by local communities to the Romanian Parliament to lobby for laws establishing new universities, no concrete economic effects were estimated. The test came unexpectedly. The health crisis caused by the COVID 19 pandemic demonstrated what until 2020 was estimated only as a theoretical exercise: the withdrawal of the university from public life led to considerable losses (Valero and Van Reenar, 2010). According to media, in Timișoara alone, the absence of university activity during the lockdown period (2019–2020) led to a loss of over 150 million euros (Iszlai, 2021). Universities are not only an important employer, a magnet of attraction for young people who come to acquire a certification opening access to a higher social and economic status, but also a consumer of local products and services, as well as an irreplaceable partner in development-innovation strategies. The presence of the university in a region allows the articulation of the quintuple helix model of development, which brings together the established series of university-industry-government spheres, to which civil society (Matei and Dobre, 2021) and the environment must be added (Carayannis

and Campbell, 2010). Only such a model leads, according to the researchers who developed it, to sustainable development or, with a term that is gaining increased ground, to sustainability for large urban localities (Carayannis and Campbell, 2010; Carayannis et al. 2021; Switzer 2021).

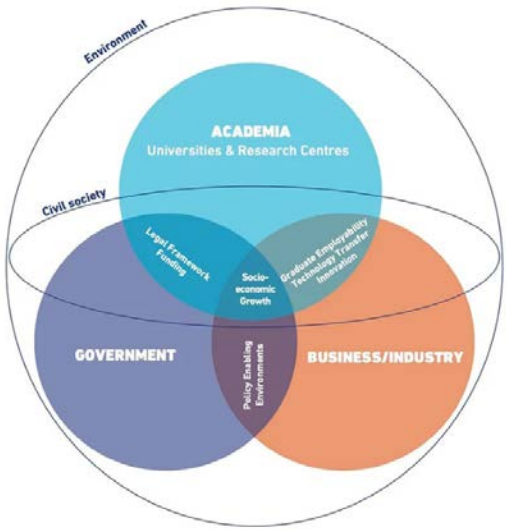


Figure 1. The quintuple helix model, apud C. Switzer

Returning to the topic of university campus and its anchoring in the urban environment, it is important to identify the functions that are shared by the city and the campus. A complex and mature campus fulfills as most essential functions (Den Heijer and Curvelo Magdaniel, 2018) the following:

- The academic function of education and research makes the campus a distinctive "oasis" of the city.
- The residential function, as housing for students, administrative and/or teaching staff.
- The function of space for leisure and relaxation: sports, cultural, dining facilities.
- The economic function – in which contact occurs with partners providing support services for the academic environment.
- The infrastructure function – ranging from pedestrian accessibility to car parks.

From country to country, from region to region, the above-mentioned functions manifest differently. In Norway, for example, the residential function does not belong to the university campus, but is carried out through a separate structure, which recurrently cooperates with universities. Housing, therefore, remains an option that students access independently of their study path. Most European universities, however, own and administer student dormitories. Their existence is perceived and presented as an advantage in educational marketing. In the United States of America there are universities that, given the large geographical distance between different educational and residential buildings, offer shuttle buses, making it more accessible to navigate the academic space. Moreover, there are voices advocating in favor of the idea that living on campus is an "integral part of the educational path" for students (Yanni, 2019), continuing the Humboldtian idea that the campus is (more) protected from the (negative) influences of the outside world (Boulton and Lucas, 2011).

Beyond the ability of a campus to meet the current needs of students and teachers for everyday work, it remains valid to maintain broader relationships with the city, at a functional level. Even in the microcosm state claimed by many researchers, the campus remains part of the urban galaxy, bound to comply – even partially – with the rules of the neighborhood. Campus-city relationships are constantly negotiated and re-created, as extensive research related to this topic reveals (Mohammed et al., 2022; Den Heijer and Curvelo Magdaniel, 2018; Jensen, 2009; Goddard and Vallance, 2014). Both the university campus and the city have resources that can be shared, thought of as complementary, in a continuum making the social, cultural, economic, and sports life in an area to be positively perceived by those who inhabit that space and perceive it as "theirs". For students, the campus is the main place for socialization, learning, access to study and research, prospecting the possibilities that professional training opens, practicing (safely) the multiple roles they will have to fulfill once they have completed their training path (Brooks, 2018). The campus offers both formal learning and informal variants for the accumulation of experiences, skills, knowledge, vital for autonomous life. This leads researchers to view campus life as a living laboratory, where history, architecture, mindsets, values, lifestyles, and learning provide endless opportunities for inspiration.

The history of higher education in Romania begins rather late by comparison to Western Europe, even if, according to some sources, university-like structures can be identified on the current territory of the country dating back to the 16th-17th centuries (Florea and Wells, 2011; Yamamoto, 2018; Ciurel, 2021). The interrupted tradition of the Michaelian Academy (founded in 1835) is taken over by the University of Iasi, now Alexandru Ioan Cuza University, named after the ruler who founded it in 1860, one year after the Union of the Principalities, thus laying the foundations of Romanian higher education. Since then, Romanian higher education

has recovered its growth rate, managing to connect to the European system by joining the Bologna process, through its contributions to defining the European Higher Education Area (Florea and Wells, 2011), respectively through the effort of Romanian universities to enter the ranking systems in the world, which position them perhaps not among the top 100, but, for those who dare to go through the exercise, in the honorable area of comparisons with the most prestigious universities in the world in terms of quality of education and research.

In the western part of Romania, the history of higher education starts also after a union, but only in the 20th century. The local Banat community had pleaded, at the border between the 19th and 20th centuries, with the Ministry of Education in Budapest for an engineering school, but the memo was treated with refusal. The union of Banat with Romania brought this desideratum to life. Practically, one year after the completion of the union following the establishment of the Romanian administration in this region, the arguments for the need for a Polytechnic School were heard and Ferdinand I signed the Royal Decree 4822/11.11.1920 founding the institution. The school was created according to the principles of the Decree-Law "relative to the establishment and organization of Polytechnic Schools in Romania" (June 19, 1920) which stated, in Article 1: "Polytechnic schools are institutes of higher technical learning assimilated by degree of culture to universities." (Vâlcovici, 1930). In his plea for the establishment of the school, the then mayor of Timisoara, Stan Vidrighin, also announced the municipality's willingness to mobilize significant sums of money and an adequate territory for the erection of the future "temple of Romanian science" (Vâlcovici, 1930), so necessary for the economic, social, and cultural development of the region. The school opens its doors to the first students in a space allocated for this purpose, but which represented only the mustard seed from which sprang the vigorous and powerful institution of today. Three years later, King Ferdinand would inaugurate the Politehnica university campus, designed in a pavilion system, with spaces for education and research, but also with much-needed residential capacities for students and teachers. Recalling the "Sisyphus work" involved in building the Politehnica, the second rector of the institution, Victor Vâlcovici, who also founded the university campus, identified the evolutionary steps taken as follows (Vâlcovici, 1945):

"*The first phase* is that of *the birth of the institution*. It has a somewhat romantic character, especially in the period preceding the actual birth, the period of spiritual gestation and contact with political factors. The period that follows includes the political decision of foundation, the law and the first impulse.

The second phase, much more important in the life of the institution, is the *phase in which the institution begins to come into being,* starting from the embryo and tending to take the shape and dimensions of the institutions with which it is approved.

Finally, *phase three* is the *phase of the permanent regime*. The institution has reached a form of maturity, of formed stability, and follows the quiet evolution of a regime set up to produce."

Anticipating the centenary of Politehnica, in 2020, Victor Vâlcovici expected that the future generations whose turn would come to concern themselves with the fate of this viable institution would "struggle with the difficulties of their times". But even so, he was convinced that the future would belong to a top institution, with scientific prestige and seriousness comparable to those of the best European polytechnic institutes.

King Ferdinand I attended the inauguration of the Mechanics pavilion, on his first visit to Banat since the region joined Romania. In his speech, the king uttered the words that have remained as the motto of the institution: "It is not walls that make a school, but the spirit that reigns within it." The encouragement to strive for academic excellence, beyond the physical materiality of the buildings and laboratories that was and is needed to train future specialists, immediately followed. The speech continues: "I firmly believe that young people and teachers will know how to hold this spirit high."

The Politehnica campus grew steadily: in 1927 the first dormitory of Politehnica was inaugurated, following the plan conceived by architect Duiliu Marcu, who also designed the project for the Mechanics pavilion. In 1930, the building housing the canteen, located next to the dormitory, with a capacity of 450 seats, was completed. This put an end to the use of improvised spaces in the city since the school developed its own infrastructure. In 1937 the sports base "Politehnica" was inaugurated. In celebrating the first quarter of the centenary, Victor Vâlcovici listed the numerous laboratories of the time, with their facilities and with what today one labels as competences developed in such spaces. The growth of the real estate assets was constant, reaching, in the first quarter of the 21st centenary, over one hundred buildings, bringing a significant urbanistic contribution to the development of Timisoara, especially in the central area. The residential area, hosting over 6,000 students, is divided between the two historical dormitories, in the immediate vicinity of the Mechanical Pavilion, and the part generically known as the "Student Complex", consisting of the buildings erected between 1960–1980, according to the model-type of same height buildings, where, besides the Politehnica dormitories, there are also the dormitories of the comprehensive university, bearing today the name "West University of Timisoara" (UVT).

1.1 The Mechanical Pavilion, a century later from its inauguration.

The seven UVT dormitories from the Student Complex were completed with three new residential units, located outside the perimeter of the campus. The growth of the number of students and the diversification of programs led to the necessity to enrich the real estate patrimony of the university, with the acquisition of new spaces for teaching and research activities, as well as for accommodation purposes. In addition, the campus section developed by UVT implemented a proposal formulated at the end of the 20th century, namely the erection of the Student Church. The former chief architect of the city, Radu Radoslav appreciates that through this architectural intervention, represented by the "Students' Church" (dedicated to the Annunciation, completed in 2000), "the spirituality of the university environment was consolidated" (Radoslav, 2023).

According to Radu Radoslav, who cites various documented proposals for zonal urban plans, after 1990 there was a proposal of the municipality to move the campus outside the city, invoking a variety of motivations (Radoslav, 2018). "The utopia has not been realized" – stated the architect, who lamented, instead, that the uncontrolled emergence of business in the student residential area led to a lively nightlife and the cancellation of the possibility of relaxation and study. The feature that the architect identifies is "turbocampus" (Radoslav, 2018), with areas that student life should exclude from the proximity of young learners. At the 100th anniversary of the campus, the "turbo" stage became, however, history. The joint

intervention of local authorities on the regulation of commercial activities and that of universities to ensure the comfort of student life contributed to the maturation of the campus fulfilling the five functions identified by Den Heijer and Curvelo Magdaniel as significant (Den Heijer and Curvelo Magdaniel, 2018). For the 21st century Politehnica:

- The buildings of the ten faculties, library, research centers and conference center allow the campus to play the distinctive academic function of education and research in the city.
- Through the sixteen student dormitories, plus two short term dormitories, the residential function is validated.
- The function of space for leisure and relaxation is fulfilled by the two sports bases, the six dining units and the cultural areas inaugurated in 2023.
- The economic function – in which contact with partners providing support services for the academic environment occurs – is developed throughout the campus.
- Finally, the infrastructure function has also undergone substantial transformations, from the arrangement of parking lots to rental stations for bicycles or electric scooters.

To the residential buildings one must add the Student Polyclinic located on campus, which offers a wide range of medical services. In everyday life during the academic year, students can access, within a radius of one kilometer, all the services they need, without having to leave the campus territory. That is why this "city within a city" (or the "oasis of youth") deserves special attention. Students do not use it as a sleeper only, but also as a place for living a life close to the one they will have after graduation, when most of them will opt for independent housing. Therefore, learning (even informally) to face the various challenges of everyday life must find its place among current concerns.

1.2 Student campus, historical part

1.3 Student campus – main residential area

During this period of development and transformation, another event occurred: polytechnics in Romania adopted the name "university" (replacing the previous terminology: "school" – a term reserved for pre-university education institutions, respectively "institute" – a term that remained in use for research institutions). Today's Politehnica University Timișoara proudly bears its name after passing through the variants "Polytechnic School" (1920–1948), "Polytechnic Institute of Timisoara" (1948–1970), respectively "Polytechnic Institute Traian Vuia of Timisoara" (1970–1991), "Technical University of Timisoara" (1991–1995), respectively Politehnica University of Timisoara. The structure of study programs has changed, new specializations have appeared, others have disappeared, following trends in Romanian and European technical higher education (Cernicova-Bucă et al. 2021). The concern for the education and welfare of students has remained a constant issue, according to a concept widely spread in the field of higher education, which puts universities in the position of acting "in loco parentis" to ensure the harmonious development of the young generation (Macintyre, 2003).

Even if we have presented in detail the campus belonging to Politehnica, which was the place of the intervention for implementing the principles of sustainable development, described in the following pages, it is worth mentioning that the academic Timișoara city also presents other forms of campuses. Created in 1945 (initially in the structure of the Polytechnic), the agronomic education in Timisoara has developed strongly not only in the direction of academic programs, but also as a complex of buildings that brings together, on the same land, educational spaces, laboratories for scientific research, utilities for micro-production activity, spaces with social destination such as dormitories and canteen, sports fields, and recreational activities. Currently known as "King Michael I" University of Life Sciences in Timisoara, the institution is located on the outskirts of Timisoara, surrounded by a dividing fence, following the model of the most modern university campuses in Europe in the 1960s and 1980s, when the Agronomy complex was built. In 2012 a student church was built on the territory of this campus, also in the logic of completing the function of the territory as "city within city".

As for the Victor Babeș University of Medicine and Pharmacy (UMF) in Timisoara, also created at the end of World War II, it had for a long time a smaller real estate dowry, using the buildings of the former Roman-Catholic high school "Banaţia", with teaching-research area and residential area. In 2024, however, the construction of a new university campus started in the peri-urban area, on the territory of Ghiroda commune. The project, which will take place on a plot of 21,000 square meters, provides for the construction of a building with amphitheaters, seminar rooms, conference center, an anthropological museum and an exhibition center, offices for teachers and scientific staff. The new campus will also have another

building with a teaching role and a building with accommodation units, halls, and sports fields.

Literature quotes Winston Churchill's words "We shape our buildings; thereafter they shape us." Carla Yanni, in an extensive monograph dedicated to the history of housing on American campuses, explains at length how campus morphology reflects (and determines) mentalities, educational experiences and even specific professional flows, after graduation, for those who have shared the educational and residential space of a given university (Yanni, 2019). Curvelo Magdaniel analyzes thirty-nine campuses, highlighting the implications that the location of the student residential area in a protected oasis, respectively in an area intertwined with the city, carry with it, and leave their mark on student life (Curvelo Magdaniel 2013). Taking these into account, we recognize that the proposed analysis is appropriate to the described local, social, geographical, morphological context and that under different conditions – even in the other types of campus, briefly presented above, some of the interventions could yield different results. On the other hand, however, many of the actions reported in this endeavor to influence student housing and make it more sustainable can be safely replicated: students received them and viewed them at least with interest, if not with engagement.

2. SUSTAINABILITY OF THE UNIVERSITY CAMPUS AS A CO-PARTICIPATORY PROJECT

Mariana Cernicova-Bucă

Universities are seen around the world as institutions that train not only highly skilled workforce, but also actively engaged citizens in society, beacons of knowledge and solution providers for the needs of present and future generations (Barnett, 2011). In the 21st century, universities are also called to be benchmarks in building a sustainable future, promoters of social, economic, technological, and social innovation, places where models are tested and validated, for society to observe and implement with the guarantee of success and awareness of the challlenges (Carayannis et al., 2021; Delgado et al., 2020; Leal Filho et al., 2019; Tanţău et al., 2011; Etzkovitz et al., 2000). In an extremely laborious exploration, Amador and Padrel Oliveira identify the interest that the emergence of the concept of sustainability has aroused in the academic community, as well as the ways in which universities have come to incorporate in their concerns the objectives of sustainable development at the level of teaching, research, social responsibility and, in the most advanced forms, in internal administrative and managerial procedures (Amador and Padrel Oliveira, 2013). From the Talloires Declaration of 1990, signed by more than 500 university leaders around the world, who committed to following 10 steps to bring the ideals of sustainability closer (Talloires Declaration, 1990), to the development of national and international networks and initiatives for universities promoting sustainability, whose number is constantly increasing (Networks..., 2024), the experience of educational institutions has been constantly enriched, both through the proposed models and through initiatives that highlighted the complexity of the problem and the diversity of approaches. A common conclusion, superbly formulated by Paula Jones, David Selby, and Stephen Sterling, is that sustainable university is more than the sum of its components, even though they can be analyzed as respecting sustainability principles (Jones et al., 2010). The components identified by these authors do not overlap with the classical series of categories regarding faculties, administrative services, and academic community,

but comprise generic categories, in a model called "the 4 Cs" – Curriculum, Campus, Community (academic) and Culture (institutional). The three authors also point out the inhibiting factors that raise obstacles to the accelerated implementation of sustainability projects, listing the resilience of academia to imposed changes (and sustainability is often regarded as an objective imposed from outside the institution), lack of expertise, ambiguity of the term "sustainability" – which still has a lot of definitions, a sign that it is a dynamic concept. The main solution that the authors recommend overcoming the stated obstacles is to adopt a collaborative process that engages all stakeholders in identifying solutions and developing strategies that lead to the implementation of sustainability in the institution. To this researchers add collections of good practice cases, the need to identify funding, exposure to international experiences in the field, all in support of turning sustainability from an abstract concept into assumed reality.

In the same line, Velazquez et al. offer a comprehensive definition clarifying the idea of a "sustainable university." Sustainable university is, according to this definition, that higher education institution that, as a whole or in its components, addresses, involves and promotes "the minimization of negative environmental, economic, societal, and health effects generated in the use of their resources in order to fulfill its functions of teaching, research, outreach and partnership, and stewardship in ways to help society make the transition to sustainable lifestyles" (Velazquez et al., 2013, p. 812). In similar terms, Sterling et al. link the sustainability of universities to the evolution of the global discourse on sustainability: "The sustainable university is one that through its guiding ethos, outlook and aspirations, governance, research, curriculum, community links, campus management, monitoring and modus operandi seeks explicitly to explore, develop, contribute to, embody and manifest – critically and reflexively – the kinds of values, concepts and ideas, challenges and approaches that are emerging from the growing global sustainability discourse" (Sterling et al., 2013). This global discourse, however, has extremely varied reflections in higher education practices, where, although sustainability is the common goal, the way to pursue it and the milestones on the road require a multidisciplinary approach. In light of complexity theories, the sustainable university profile is, in turn, a multifaceted issue (Leal Filho et al., 2021, Shawe et al., 2019).

The paths chosen by universities to achieve the goal of becoming sustainable institutions are very diverse, as Hans van Weenen points out at the beginning of this century, in an attempt to shape a model based on existing international experiences (van Weenen, 2000). First of all, institutions that take on such a challenge must find appropriate answers to questions about why they are committed to sustainable development goals, what steps the institution needs to take towards sustainability and

how it organizes, strategically and managerially, the transformative process. Since there is no universally valid "recipe", van Weenen groups the inventoried approaches into evolutionary, by key elements and revolutionary pioneering. Leaving the process of pursuing sustainability exclusively to bottom-up initiatives, from the component units of the university to its whole, carries the risk of proliferating results that do not fit into a logic of strategic approach and may miss the indicators by which a university measures the success of its transformative process towards sustainability. However, a top-down approach risks failing to mobilize large parts of the academic community and influence organizational culture (Tilbury, 2012). Convergent efforts are needed, combining both types of efforts (top-down and bottom-up), aggregated at strategic and logistical approach levels, to promote sustainability (Alba-Hidalgo et al., 2018). Despite the growth – we could even say exponential – in the number of initiatives to design transformative sustainability-oriented programs, it is still extremely difficult for an academic institution to achieve meaningful change through a robust holistic process. Organizing reflection and consultations to solve the collective dilemma related to sustainability implementation and projective pedagogy can stimulate the solution of the difficult task of creating synergy and aligning pedagogical actions guided by sustainable development principles, as part of broader educational philosophies, both at individual and institutional levels (Brunstein and King, 2018).

An interesting solution for triggering the process of implementing sustainability in an institution is formulated by Vergragt and Quist, who propose the backcasting method, consisting in setting the objective to be achieved in the future and imagining, by reverse logical deduction, the steps (actions, strategies, policies) that make possible the fulfillment of the vision of the desirable future (Vergragt and Quist 2011). For the particular case of universities, Géring et al. add to the definition of the backcasting method the idea of participatory process (Géring et al., 2018), precisely to eliminate uncertainties and fears related to the (un)sustainable future of higher education. The exercise described by these authors brought face to face the visions of students and teachers about a desirable future, starting from mapping the present state and continuing with highlighting the divergences of visions appeared in the two groups, divergences that, if left unmediated, can lead to dissatisfaction and disengagement as the target approaches.

Only a collaborative, co-participatory process can eliminate the sense of alienation or frustration that jeopardizes organizational culture and the ability to act towards sustainability. Especially since, due to the forces of globalization, the academic community has become hyperaware of current trends and reacts relatively quickly to the challenge of absorbing sustainability principles (Purcell et al. 2019; Sterling et al., 2013). This process also highlights the need to adjust and resume the participatory approach, depending on the results obtained at each parameter and at

each action stage (Velazquez et al., 2006). The road does not remain without dangers, largely due to the contradictions that appear in the mediation of the vision regarding the goals to be achieved: democracy vs. piloting the process towards achieving the goal, individual interests vs. collective interests, growth vs. limits, etc. (Dovers and Handmer, 1993; Poto, 2023). Stressing that the European and North American vision of participatory processes is not necessarily applicable to other socio-economic contexts around the globe, Margherita Paola Poto questions, for example, whether sustainability is intrinsically linked to participation (Polo, 2023). Most authors, however, advocate co-participation, co-creation, co-design, considering such an approach to be aligned with inherent traits of sustainability (Ansel et al. 2022). On the contrary, insufficient research into the link between co-participation and sustainable development is seen as a gap to be reduced by a more assiduous study of the subject (Avila-Garzon, 2024).

In the context of the academic environment, the dominant argumentation that emerges from reports, case studies and research articles is that the initiators of the process of implementing sustainability principles are obliged to identify the possibility of attracting stakeholders from universities in creating a common vision, starting from ensuring a common basis of knowledge on the components of environmental responsibility and sustainable development, up to the development of procedures and regulations to steer everything that happens in the respective institutions towards convergent goals. All components included in the life and operations of universities are targeted: the teaching process, research, the organization of academic life and the provision of services with impact on the welfare of the intra- and extra-institutional community, up to attracting projects and organizing activities that accelerate the incorporation of sustainability objectives into the intimate fabric of the university's existence. Noting that the concepts of "co-participation" or collaborative process also involve several interpretations, Disterheft et al. proposed an adequate description, allowing for comparisons between experiences gained by different universities: "By participatory processes within sustainability initiatives we understand the engagement of all critical stakeholder groups into a deliberative process design to define goals, responsibilities and actions toward the transition to a more sustainable university now and in future " (Disterheft et al., 2015). The question these researchers raise is not whether sustainability should be targeted at all, but how to chart the path and provide evidence of "sustainable university" status (Ruiz-Mallén et al., 2020; Disterheft et al., 2015; Sterling et al., 2013). The proliferation of sustainability measurement tools and rankings for universities wishing to assess their level demonstrates a desire to develop an optimal paradigm (Disterheft et al., 2015; Findler et al., 2018), even if ranking systems have proven to be imperfect or insufficiently sensitive to differences in sustainability implementation according to

geographical, climatic, social and political conditions around the globe (Olcay and Bulu, 2017; Bougnol and Dulá, 2014; Soh, 2016).

Faced with these concerns, which are extremely diverse and call for several research and action plans, the interest in sustainability in Romania seems quite low (Prada et al., 2020). Few Romanian universities go through the exercise of entering the classification systems about "sustainability", most preferring the older and more familiar rankings that measure the performance of scientific research. The pioneer is Babeș-Bolyai University (UBB) of Cluj-Napoca, the first higher education institution in Romania to join the Sustainable Development Solutions Networks network (Zanellato and Tiron-Tudor, 2021). The experience of the transition towards transforming UBB into a sustainable university, described by Zanellato and Tiron-Tudor, went through the inventory of initiatives which spontaneously appeared in the institution at the stage of piloting the process and, finally, at the evaluation and recognition of sustainable development features (Zanellato and Tiron-Tudor, 2021). However, this model does not necessarily suit any higher education institution, be it Romanian or from another country; international examples show that different universities have triggered similar processes starting from other priorities (Burmann et al, 2021; Ruiz-Mallén and Heras, 2020; Sen et al., 2022).

Research and reports analyzing the emergence of universities as sustainable institutions, the frantic search for appropriate models and the imprecision of the terms used to describe interventions create the image of sustainability as a Gordian knot. Those who want to attack it need the courage to start from any point, but also need stubbornness and perseverance, not to tire along the way. Quite a few of the practical experiences presented in literature zero on the university campus as a place from which transformative intervention can begin. Sugiarto et al. make an inventory of the extremely rich pool of case studies and analyses on sustainable campuses (with alternative terminology of green campuses), a significant part of which also refers to collaborative processes that facilitate the creation of a sustainable university campus (Sugiarto et al., 2022). Most analyzed universities found that stakeholder involvement in pursuing sustainability principles on campus increased the motivations of these actors, increased their satisfaction, attachment to the institution, and quality of life (Sugiarto et al., 2022; Dagiliute et al., 2018; Garrecht et al., 2018).

As a design for implementing sustainability principles on campus, we adhere to the co-creation cycle model, which starts from articulating the stakeholders' vision of the pursued goal. This stage is usually carried out through interviews, focus groups, opinion polls, study of position papers (if any). The synthesis of key ideas shall be brought to the attention of stakeholders and validated for the setting of measurable objectives (SMART). The implementation of specific actions is followed by a stage

of evaluation of results, to allow relaunching the process, to eliminate gaps, build new objectives, attract new resources (human, material, technological, etc.) (Zarandi et al., 2022; Katz, 2021). Creating a climate of dialogue, permanent consultation of stakeholders during the implementation of the assumed objectives, adjusting the envisaged measures according to the realities on the ground (and avoiding projects "in books" or "in the office") not only ensures the conditions for success, but also contributes to strengthening the social-communication capital (Tarnovan, 2015) in the institution, as well as to developing the resilience of the institution (Carmen et al., 2022). The latter concept, resilience, has also gained prominence in recent years, particularly after the 2019–2021 health crisis caused by the COVID-19 pandemic. As already stated in this chapter, the urge to rebuild institutions, socio-economic activities, interpersonal relations "better", "greener", "more sustainable" was reiterated at all levels: in public speeches, in declarations of intent, in action plans. Social capital on campus can (and must) be identified in the sphere of informal social relationships that crystallize at the level of this "city within city", formalized by working within the student leagues operating on campus, by interpersonal trust between students, respectively between them and hostel administrators, and by trust in the university as a whole. The intervention to raise the level of sustainability has direct effects on this social capital, with the potential to increase the cohesion of the community formed on campus.

The life of universities takes place according to the academic calendar, with periods of close contact between educational partners, alternating with holidays – in the Romanian reality, quite long – during which communication exchanges are interrupted and group cohesion weakens. In residential life in student dormitories, there is also a dilution of ties, since only administrators have a continuous presence on campus, while students cut off the connection between themselves and the dormitories during the summer holidays, and, upon return, they do not necessarily live in the same place, nor with the same roommates, nor in the same configurations. Under these circumstances, they remain attached to affordable (subsidized) housing on campus, rather than to a specific place. Studying life in a Romanian campus faces another impediment: the monitoring infrastructure. Lifestyle tracking and assessment of consumption habits cannot be done with intrusive methods. They would be both costly and marked by subjectivity and may be viewed with suspicion (if not hostility) by on-campus resident students. The student dormitories where the presented project was implemented perform only consumption monitoring (water, heat, electricity) at building level, not at accommodation unit level (floor, room, or group of rooms). In addition, lapses of up to three months occur between meter readings and billing. An extensive number of dormitories is an advantage in educational marketing, being one of the important

factors that young people consider when choosing the institution to facilitate their access to long-term professional training. On the other hand, the university sees itself in the situation of managing an infrastructure created in the conditions of the past, but which it must adapt to the needs of the present, to new expectations and lifestyles (Yanni, 2019). The contemporary student expects to find not only a bedroom, a kitchen, and a laundry room, but also an infrastructure for study, with sockets for laptop or tablet, with a good Internet connection, with possibilities for socializing, with opportunities for leisure. The imprint that Politehnica students have left on the residential area can be seen in the appearance of bicycle stations, pavilions that allow them to stay outdoors even in adverse weather conditions. The most visible change was the personalization of the main facades of the dormitories on Students' Alley through the appearance of murals in 2020, at the initiative of the "Memoirs of the Citadel" program, which produced a series of interventions in the gathering places of students and the community, to facilitate and encourage their interaction with the public space in which they live, temporarily or for a longer term (Memoriile Cetății 2023). The new face of the campus responds to a higher degree to the taste and expectations of this generation of students, which also foresees other interventions, such as the ones promoted by the "Creative Campus" project (ongoing in 2023–2024). The feeling that they are listened to, that their voice matters, strengthens students' confidence in the educational environment and opens them to what the university proposes as experiences and opportunities, both in formal settings and in their free time. Student initiative and creativity are encouraged, but, in parallel, co-participatory approaches are also facilitated. In this way, students have learning opportunities in a non-formal, experiential setting, different from what happens in classrooms, laboratories, and practical activities included in the academic curriculum. The reflection on the approach proposed by the USE-REC project, described in this volume, aroused their curiosity because it changed the ways of interaction, proposed new forms of action, integrated fresh perspectives in the way of approaching the topics under discussion and requested reflection / evaluation on lived experiences (Lubicz-Nawrocka and Bovill 2021). The actions undertaken within the project are described at length in the following chapters; the core foundation aligns with international good practices, aimed at interventions on campus.

Investigating students' opinions and behaviors in the run-up to the project, consulting them (through focus groups) on interest in environmental and sustainability issues, broadcasting informative and/or persuasive messages on a multitude of channels were combined with providing opportunities for manifestation on events with physical or virtual presence. The information on the progress and effects of the project also incorporated the views of the UPT administrative staff

and management. Also, signaling the effects that students' current life produces on the natural and built environment contributed to the consolidation of the social-communicative capital mentioned above. Since the start of the project and continuing after its completion, students from the Politehnica campus have been exposed to nudge messages, which presented the consequences of the habitual behavior in the domestic environment: consumption of water, heat, electricity, the habit of managing household waste in a certain way. The model for constructing these messages was nudge, as described in the highly influential book "Nudge. Improving Decisions About Health, Wealth, and Happiness" by Richard H. Thaler and Cass R. Sunstein (Thaler and Sunstein, 2008, 2016 for the Romanian edition). According to Thaler and Sunstein, nudging is a (communicational) intervention that points people in the right direction without coercing them, putting the subject of nudging in a framework that highlights why the proposed direction is beneficial. The nudge does not significantly alter the structure of incentives toward socially desirable behavior, but rather changes some elements of the environment in which people make choices. The model became so popular (especially after Cass Sunstein became a member of the Obama administration and Richard Thaler won the Nobel Prize in behavioral economics) that the United Nations, through its environmental program, developed a nudge guide for college campuses. The Little Green Book of Nudges (United Nations Environment Programme, 2020) proposes verified nudges that work, seeking to encourage more sustainable practices among students and staff running the student campus. It also provides simple guidance on how to implement and evaluate behavioral interventions in a variety of contexts. The USE-REC project team developed its own messages, tailored to the target group, but in the key of the same philosophy, of providing examples that put into perspective the consequences of the habitual behaviors of daily life: personal hygiene, cooking, laundry, etc. The model also faces criticism, from those who claim that the persuasive approach is manipulative and violates the personal autonomy of the person exposed to the nudge (Van Roekel et al., 2019, Bîgu, 2019). The project team made sure, however, that the messages refer only to verifiable information and do not contain elements that fit into manipulative discourse but are nevertheless oriented towards supporting behavior change towards one that is sustainable. From the proposal of the United Nations model were retained the essential features in the elaboration of the messages, which were:

Easy – in the sense that the proposed solutions are easy to implement.
Attractive – through dynamic and pleasant visual material.
Social – by promoting that other people have adopted a pro-environmental lifestyle and highlighting the benefits of a sustainable lifestyle.

In the present tense – based on scientifically tested findings that young people value the known present more than a future they do not imagine very clearly, the messages have been configured to refer to the immediate benefits of adopting sustainable behavior.
Their sequence and insertion in the communication strategy are explained in the chapter dedicated to the campaigns carried out within the project.

Researchers who focused on consumer behavior – and in the described case presenting the project, the students were also seen from the perspective of their role as utility consumers, with an effect on the environment – emphasize that, being exposed to the same information, subjects make different decisions, depending on their mentalities, predispositions, and education. In this sense, Lindenberg and Steg formulate the goal-framing theory, which postulates that goals "frame" how people process information and act to achieve it (Lindenberg and Steg, 2007). The cited authors warn that except under laboratory experiment conditions, in everyday life a person has several active objectives, which may (or may not) be compatible. In other words, the strength of the main lens can be influenced by other lenses that are in the background. Efforts to influence pro-environmental behavior must take these into account and reduce situations that lead to not acting in an ecological manner (Chakraborty 2017). That is why the placement of pro-environmental messages was framed in a coherent approach, which combined exposure to information with the call to action, early rewarding student actions in favor of sustainable behavior with invitations to social events, incorporating unconventional illustrations of environmentally friendly behaviors and which tend to minimize the environmental footprint.

The co-participatory approach has brought as advantages, as will be seen in the following chapters: identifying and prioritizing directions of action, adapting theoretical models of approaching sustainability to specific conditions, expectations and potential of identified target groups, developing communication strategies in accordance with the specifics of the academic community in Politehnica, educating students through extracurricular, informal activities to become "sustainable", autonomous adults with specific features of European eco-citizenship, enriching knowledge on the ways in which universities (can) start the process of implementing sustainable objectives and values in their way of operating, creating support points for a backcasting exercise, so that the ideal of a sustainable campus is a clearly outlined one, with milestones and steps aimed at both the technical component of housing optimization, and the human dimension of the lifestyles adopted by the residents of this campus. This type of approach takes place in conditions where the socio-political and economic climate in Timisoara offers multiple co-participatory instances. An

initiative of the Council of Europe in 2007 led to testing the possibility of Timișoara being a territory of co-responsibility and going through the exercise of creating welfare indicators through citizens' input (Cernicova-Bucă, 2012). In 2019–2023, the Timișoara – European Capital of Culture project invited citizens – including students – to co-participatory approaches, from developing the application file for this title to assessing the impact of the actions carried out (Turșie, 2021). Finally, the creation of the Decidem digital platform collects all co-participatory initiatives in which the City Hall is involved, providing transparent and open information on projects and strategies for the benefit of the city's development. Politehnica students, for example, experimented with the possibilities of using the principles of participatory budgeting, promoted by the municipality, to obtain funding for their projects. In such an environment, the project's approach was a natural instance of handling a problem of great complexity.

3. FROM IDEA TO ACTION - DESIGNING THE INTERVENTION FOR THE POLITEHNICA CAMPUS LIFE

Gabriel-Mugurel Dragomir

3.1. Background, plan, design

The project described as an intervention on the Politehnica campus, entitled *University Students Engaging in Responsible and Sustainable Energy Consumption (USE-REC)* was proposed by Politehnica Foundation Timisoara, Romania in partnership with Quality Management Software AS (QMS), Norway and conducted between May 2023 and April 2024. Researchers concerned with higher education issues and students' problems, as well as university managers have found and draw attention to the asymmetric relationship between the beliefs and attitudes of the young generation (Crumpei et al. 2014) and the actions and behaviors of this generation (Cernicova-Bucă et al., 2021). On these premises, the idea of the project proposal was to reduce, through targeted actions, the gap between pro-environmental regulations, statements and/or beliefs on the university campus, on the one hand, and actions and lifestyles on that campus, on the other. The focus was on increasing knowledge on renewable energy, energy efficiency and energy security of different categories of public in the Politehnica University of Timisoara. As a side effect, the project aimed to contribute to reducing the carbon footprint of the student campus.

The key factors in training and educating the younger generation are, according to the project team's conception, but following international examples of good practice (Clark, 2004; Mohammed, 2022):

- students, as actors and beneficiaries of the project;
- administrative staff, responsible for student dormitories and student services;
- the management of the university, as a regulatory and reporting body.

The recent health crisis caused by the COVID-19 pandemic has reorganized society's priorities and brought to the fore the need to "rebuild a better, greener, more sustainable life". The sustainability component and priorities set by the United

Nations for 2030 have been evaluated and the results are far from being encouraging (Yuan et al., 2023). Despite the signs that the growth curve of pollution was by tempered due to stopping entire economic branches during the pandemic, the countries of the world have concluded that "pulling the plug" is not the solution for attaining the desired sustainable development. Ensuring economic and social resilience depends crucially on investing in green technologies, but also on encouraging people to adopt sustainable lifestyles and sparing natural resources (Aulie 2023). The link between the local component and the overall impact of human activities has been highly visible and has led to increased commitments to caring for the environment (Leal Filho et al., 2022).

At its scale, Timisoara, and the institutions on its territory, including universities, have placed as priorities, in the post-pandemic life, the reduction of the effects of socio-economic activities on the environment and the adoption of solutions that resonate with the sustainability objectives of the 2030 Agenda. Despite all concerns regarding the pursuit of the Sustainable Development Goals, only one university from Timisoara, West University of Timisoara, has taken steps to enter the evaluation of **UI Green Metric World University Rankings,** joining 10 other higher education institutions in Romania (out of the 92 accredited) in the classification that measures the commitment of each participating university in developing a green infrastructure.

Even before the pandemic, the student campus was declared a pedestrian zone, and the bicycle and electric scooter stations that were installed, partly with the help of the City Hall, in an effort to encourage bicycle transport (within metropolitan mobility), partly by the Politehnica University, were support points for adopting a sustainable lifestyle. Sporadic initiatives to encourage environmental footprint reduction are present (such as Earth Day or Green Week 2021 activities), but – appreciated the project team – an integrative vision was lacking. The inventoried initiatives either dealt with the purely technical aspect of sustainable living (availability of devices, facilities, etc.) or with short-term campaigns involving citizens in sporadic green initiatives. Thus, the project approach incorporated:

- **The human component**, targeting the student population, urged to adopt and promote a responsible and sustainable consumption of energy, through information and awareness campaigns and training opinion leaders as ambassadors of the project.
- **the managerial component**, aimed at the decision-making level of the university, encouraged to incorporate into the future strategic vision a strong, clear, sustainability-oriented component including the project results;
- **the procedural-administrative component**, by harmonizing the knowledge and behaviors of residential space managers, through training courses and

by developing modern infrastructure for informing campus residents about efficient energy consumption objectives; ensuring appropriate documents to support sustainable behavior on campus premises (such as lease contract annex, campus housing regulations, etc.);
- **technical component,** thermal scanning of buildings, to discover energy waste points; monitoring utility consumption in dormitories, respectively completing an inventory of devices used by students on campus, to create correlations between recorded consumption and the use of appliances and devices; collecting used light bulbs and small devices to prevent them from polluting the environment.

As a result, the project aimed to create a synergy between the efforts made by the Politehnica University and local authorities to actively and consciously pursue the sustainability targets set in the United Nations 2030 Agenda for Sustainable Development Goals. The years of study of the future highly qualified workforce prepare not only professionals, but also citizens, individuals whose lifestyle, behavior at home, at work and in society influence the well-being of all. The targets set by the project team were to create the premises for a large-scale approach, allowing the approach of the topic "sustainable campus" through: 60 student ambassadors of behavioral change for sustainable energy use, at least 7000 students exposed to demonstration activities, to put into practice and actively engage in the parsimonious use of energy; 20 administrative staff to oversee and promote sustainable energy use on campus. These objectives are underpinned by the elaboration of database-based solutions for prioritizing interventions towards campus greening, the development of procedural-administrative tools to ensure continuity in the application of energy efficiency measures on campus and at least one strategic planning document, adopted by the university management, targeting the sustainability component on campus.

The implementation of the project started from the SWOT analysis on the specific conditions of the moment of triggering the intervention on the Politehnica campus, highlighting the stakeholders and the existing experiential, human and material resources:

Strengths
- Politehnica Foundation Timisoara, which submitted the project, is an old non-governmental organization (active since 2009), known in Timișoara and in the West region.
- The mission of the Foundation aligns with that of Politehnica University of Timișoara (promoting the prestige and image of Politehnica University

of Timișoara and developing its educational, scientific, cultural and sports performances)
- The Foundation collaborates and develops partnerships with decentralized public services of ministries, central and local public administration bodies, as well as with other state or private institutions.
- It has experience in implementing various projects.
- It is committed to promoting the values of Banat region, Timisoara, and Politehnica University, which include sustainability goals and greening the campus in the coming years.
- The project team, part of the Center for Interdisciplinary Research in Communication and Sustainable Development of the Politehnica University of Timișoara (Policom) is experienced in social interventions.

Weaknesses
- Dependence on donors who, after the crisis caused by the COVID-19 pandemic, allocate fewer resources to cultural, social, and environmental responsibility projects.
- The fluctuating nature of student volunteers
- The gap between awareness and action in the younger generation

Opportunities
- Development, in 2023, of the Timișoara European Capital of Culture program
- The commitment of the City Hall and Politehnica University of Timișoara to green policies
- The innovative spirit of Timisoara – the first European city with electric street lighting (1884)
- European, Romanian, and local politics encourage Green Week actions.

Threats
- Potential shortages and reductions in energy consumption due to socio-political and economic context
- The lifestyle of the younger generation depends on a multitude of devices and appliances that need electricity.
- subsidized housing costs (in student dormitories), leading to low student awareness of energy consumption and environmental footprint.
- the possibility of new, previously unknown disruptive challenges.

In implementing the project, the Foundation intended (and succeeded) to attract new partnerships and encourage the transfer of good practices in the country and

worldwide, through exchanges of experience, visits, consultancy, and scientific research. The approach was anchored in a research-action paradigm, which allowed permanent consultation of stakeholders and adaptation of envisaged solutions to the interests, expectations, and emotional and time availability of the academic environment (Kemmis, 2010). Also, the integrative and practical research action proposed by the project team incorporates an objective, international perspective and the possibility for know-how transfer to be tested and implemented in Timisoara, a city recognized as open to innovation, respectively in the Politehnica University, an institution constantly concerned with responding to the needs and concerns of the community.

Accessing Innovation Norway funds through the "Energy for Romania Program" contributed (as will be seen below) to prioritizing energy efficiency among the general environmental concerns in the local community and mitigated the shortage of funds available to NGOs, caused by the recent pandemic, which hit the economic sector and put corporate social responsibility funds on hold for short- and medium-term projects.

Below are briefly presented the activities foreseen in the project, meant to lead to behavioral and attitudinal change stated in the title of the project and placed under the mobilizing slogan "I care" (www.imipasa.upt.ro)

Project activities

Activity 1. Assessment of the existing situation

A1.1. Sustainability assessment of energy consumption concerns seen by key stakeholders

A vision on interventions to reduce energy consumption involves conducting assessments on several levels: at the level of university management, at the level of administrative staff of student dormitories or teaching buildings, and at student representatives' level. Details about the methodological approach are presented below:

A.1.1.1 Conducting individual interviews with UPT decision makers: rector, vice-rectors, administrative directors, heads of key departments in UPT (relevant for energy consumption)

Objectives:

- Prioritizing institutional concerns regarding energy consumption;
- Institutional breakdown of energy consumption by buildings and destinations;
- Identifying large consumers and ways to reduce waste;

- Identifying solutions to reduce energy consumption while maintaining the level of activities at a perceived optimal level;
- Determining the attitude towards the main sources of alternative energy production and the desire to incorporate them into future strategies;
- Identification of targets for reducing energy consumption.

The UPT strategy contains a medium-term objective of greening the campus, extended to educational buildings or recreational spaces. This project activity aimed to provide data-driven solutions for optimizing future decisions on sustainable energy consumption, in combination with changing behavior of utility consumers in the residential area and with the prospects of technical innovation for campus and other academic buildings.

A 1.1.2. Group interviews (focus groups) with dorm administrators

Objectives:

- Identifying concerns related to responsible energy consumption;
- Determining the main causes of increased energy consumption/energy loss in living spaces;
- Identifying the level of commitment to the implementation of alternative sources of energy production and the main obstacles to overcome;
- Identifying feasible solutions to reduce energy consumption without affecting quality of life.

A 1.1.3. Group interviews (focus groups) with representatives of student leagues and heads of dormitories and floors

Objectives:

- Assessment of concerns regarding responsible energy use and energy security;
- Determining the main sources of increased energy consumption/waste in homes;
- Identifying ways to reduce consumption without affecting students' well-being and comfort;
- Assessment of the level of information and attitude towards the main alternative sources of energy production;
- Identifying readiness to implement solutions for reducing energy consumption and increasing energy efficiency.

The expected result was to assess the level of self-reported desirability on renewable energy and energy efficiency in target groups, as well as to measure the level of knowledge of solutions regarding the use of renewable energy, respectively ensuring energy efficiency and energy security.

A 1.2. Mapping the energy consumption patterns of students on campus, in relation to objective variables (energy efficiency of the built environment)

In order to successfully implement awareness campaigns to increase capacities and skills related to renewable energy, energy efficiency and energy security, the project assessed the daily energy consumption on campus, highlighting heat losses per building, energy consumption at the level of each type of student dormitory, as well as the ways in which buildings, appliances and devices contributing to energy consumption are used. The above-mentioned evaluations were supplemented with thermal scans performed for buildings on the student's campus, for highlighting points of energy loss. These scans lay at the basis for proposals for energy efficiency solutions and student education to develop sustainable energy consumption and reduce the carbon footprint of campus buildings and their residents.

The expected outcomes were related to improved knowledge about the consumption patterns of students living on campus; energy efficiency of buildings broken down by location and season.

A 1.3. Identifying students' energy consumption behaviors

Consumers' sustainable energy consumption behavior requires them to be aware of the social and environmental impact of the goods and services they use. At the start of the project, there was only sporadic, unsystematized information about energy consumption among the target audience of the project (UPT students), in everyday personal or professional activities. The proposed method for analyzing the situation and establishing the baseline was the sociological survey that aimed at:

- Identifying energy consumption behaviors among students;
- Identification of electrical appliances and devices commonly used on campus or at home (for students living with parents or renting housing in Timisoara) and frequency of their use;
- Assessment of knowledge (based on self-assessment) about energy consumption (establishing the level of pre- and post-awareness campaigns, repeated surveys, to estimate perceived differences/changes in students' knowledge and attitudes towards energy consumption);
- Identifying factors that influence behaviors and lead to responsible and sustainable energy consumption;
- Determining the level of information and attitude towards the main sources of alternative energy production.

The expected result was related to increasing awareness of knowledge (based on self-assessment of the target group) on renewable energy and energy efficiency, leading to the creation of the student-consumer profile of electrical appliances and utilities in student dormitories.

Activity A 2. Developing improved skills and knowledge of relevant actors to promote more efficient use of energy

A.2.1. Exchange of experience with Norwegian partner

Visits to Norwegian university campuses aimed to observe, on site, practices, and concerns on sustainability measures in the field of energy consumption and student life. The Norwegian partner facilitated the visit.

A.2.2. The visit of the Norwegian partner to Timisoara to advise the project team on the greening measures of the student campus, on the content of the training package and on the solutions to be submitted to the management of the Politehnica University.

The expected result targeted improved skills regarding renewable energy and energy efficiency, improved knowledge on greening measures that can be implemented in the conditions specific for Politehnica campus.

A.2.3. Training on increasing energy efficiency in student life

A 2.3.1. Training of administrative staff with responsibilities in the field of student housing

The project organized a one-and-a-half-day training with administrative staff involved in the management of spaces and services for students. Participants were trained to work with energy consumption monitoring tools. Concrete steps to increase and strengthen student routines leading to saving energy were also presented (checking the operation of switches, disconnecting devices when not in use, etc.).

The expected results were related to increasing the level of knowledge on renewable energy and energy efficiency; improving skills to implement measures to use renewable energy and ensuring energy efficiency.

A.2.3.2 Training students as vectors of change for sustainable behavior (project ambassadors)

40 students were trained as vectors of change. Two training groups were organized in which students were informed about the main objectives of the project. The activities focused on communication, persuasion, and technical aspects of reducing energy consumption. Under the coordination of the trainer, students also developed action plans incorporating sustainability issues. Later they helped disseminate information about the project, support the organization of competition between dormitories, mobilize participants in events, etc.

Capitalizing upon project results and experiences, the project team extended educational interventions with a seminar on developing skills for sustainability at work, held on the occasion of the spring edition of Career Days in UPT (2024), respectively with a series of webinars under the generic "I love the planet, I care

about resources". The 6 episodes explain and promote the benefits of adopting a sustainable lifestyle.

The expected results aimed at increasing the knowledge of the target group on renewable energy and energy efficiency, improving students' abilities to adopt and promote sustainable and eco-conscious behavior.

A.2.4. Summer School *Living and promoting sustainable lifestyles*

20 students from the ***Faculty of Communication Sciences*** attended, in 2023, the urban summer school ***Living and promoting a sustainable lifestyle***. They participated in training activities, studied good practices for efficient use of energy (as part of social and environmental responsibility in various industries), proposed initiatives and messages aligned with project objectives. At least one student took advantage of this opportunity and developed a graduation paper project.

The expected results were to increase the level of knowledge on renewable energy and energy efficiency, respectively to improve skills for developing and promoting sustainable energy consumption behavior.

Activity 3. Information and awareness campaign on sustainable energy use

The student awareness campaign on sustainable energy use was the central pivot of the project. The project team organized a series of events, throughout 2023, which targeted over 7000 students as a direct audience, reaching up to 13,000 students in total. The communication activity consisted in providing general information about renewable energy and energy efficiency, making, and disseminating thematic videos for student dormitories, transmitting specific information related to events and trainings, distributing promotional materials about the competition between dormitories. The campaigns took place both online and offline. The channels that were used for this activity were developed in the project (dedicated website, social media accounts on Facebook and Instagram, creation of a network of smart TVs, installed in student dormitories for broadcasting messages), but also traditional media relations, cross-message distribution on web pages and social media accounts belonging to project partners.

A. 3.1. Online information and awareness campaign

A 3.1.1. Actions to inform students about methods of more efficient use of energy

Periodically (monthly or once every two months) students received online messages with information about sustainable energy consumption, such as routine actions to use energy sparingly (e.g., turning off the lights when watching TV, unplugging electrical and electronic equipment when not in use, etc.). The campaign was promoted through the StudentUPT mobile application, targeting over 10,000

students. Similar content was posted on the project's social media accounts, the results being reflected in statistics on the number of sent messages and through the engagement of the target group with these messages.

The expected results were to improve students' knowledge on renewable energy and energy efficiency, respectively to stimulate their willingness to participate in project activities.

A 3.1.2. Turn off and unplug/Why not unplug? – A competition was organized through social media to design and transmit messages that lead to the adoption of sustainable energy behavior. Students created messages on this topic for the main social networks (Facebook, Instagram, Tik-Tok, You tube, etc.) and promoted them through their personal accounts. The 10 most viewed video productions were rewarded with 10 solar chargers for mobile phones.

The results were an increased knowledge on renewable energy and energy efficiency, respectively a higher awareness of the ongoing campaign.

A 3.2. Offline information and awareness campaign, conducted through original events and participation in already established and well-attended student events.

A 3.2.1. *Change a Light Bulb! Choose an economical one!* Politehnica students were invited to replace traditional light bulbs with energy-saving solutions (LED). The action took place against the background of the evocation of November 1884, when 731 electric street lighting lamps were put into operation in Timisoara, as a premiere for street lighting in Europe.

The desired result was related to the adoption of sustainable behavior, increasing knowledge about sustainable energy consumption, increasing partners' visibility and project objectives.

A3.2.2. Organizing a **competition between student dormitories** ("Student energy fuels sustainable energy"), to motivate students to get actively involved in energy saving and sustainable energy consumption. At the entrance to each dormitory, a TV screen was installed to broadcast instructional messages to students on efficient energy use and energy saving actions. The messages were distributed throughout the project and continued after its completion. The first assessment of the effect was made three months after the start of this campaign. The 2022 statistics were used as baseline energy consumption data to calculate saving behaviors and designate the winning dormitory.

The winners automatically received invitations to the LED DiscoTech event, a socializing opportunity that provided an example of alternative ways of partying, as well as information raising awareness of energy consumption possibilities.

The results sought and obtained were related to improving knowledge about sustainable energy consumption and illustrating types of actions specific to sustainable behavior, with effect on reducing CO2 emissions.

A 3.2.3. Party like the lights are off **(LED** Disco TECH**)**

LED DiscoTECH was an invitation to the party in a multifunctional space, with atmosphere created exclusively by LED light projections, where DJ Benito and MC Steliano transmitted to the rhythm of music the main messages of the project "I care". The original event was organized in an atypical space, with memorable moments – lights off to reflect on the needs of the planet and generate Instagrammable images created with the help of fluorescent bracelets shared by the organizers. The project Facebook page transmitted the party via live streaming. A moment of awareness was also generated about noise pollution and power consumption generated by the audio installation. The musical and social event created the atmosphere for awarding the prizes for the video-message contest, combining the academic learning experience with the fun specific to the students' age group.

The results were related to the transmission of improved knowledge about sustainable energy consumption and the adoption of sustainable behavior.

A 3.2.4. "Run for sustainability" at 103 for Poli (Alergotura)

The Alergotura event, organized since 2015 within the "Politehnica Days" every November, is a marathon attended by professors and students from the Politehnica University, each making a tour of the stadium, to celebrate the number of years that have passed since the establishment of the university (103 in 2023). For each running lap, one participant received a T-shirt with project messages. The USE-REC team participated in 2023 with two laps of running for sustainability.

The results were to increase participants' awareness of the actions taken by the university for sustainability.

A 3.2.5. Reducing the environmental footprint by developing recycling behaviors

Recycling is a collective responsibility for a sustainable future. During the project, Politehnica Foundation aimed to identify a partnership to support the implementation of more efficient collection solutions for recyclable waste in student dormitories.

The results were to increase public awareness of energy consumption, increasing knowledge on environmentally responsible behaviors.

Activity 4. Assess students' change in knowledge and behavior regarding energy efficiency and lay the basis for sustainable action

A. 4.1. At the end of the project, a survey was conducted to assess the level of knowledge and skills in the target audience (students) regarding the sustainable and efficient use of energy, caused by the campaigns.

A.4.2 The final survey relied also on a package of documents implemented to foster responsible energy consumption at institutional level, including: an annex to the on-campus lease contract, an accommodation regulation, a position paper on sustainable energy consumption.

A 4.3. The project team ensured the dissemination of the progress and results of the project to the scientific community and the general public by participating in 2 scientific conferences and 2 workshops, publishing 2 scientific articles and 1 popularization article granting credit to Innovation Norway as a funding body. Also, the project team presented the project results on TeleUniversitatea TV shows, as well as on shows broadcast by Radio Vest and TVR Timisoara. Local and regional media covered extensively the major activities of the project.

The project team presented the results also in face-to-face events.

Over 70 representatives of UPT management, social services, student leagues, administrators of residential and study buildings, students and partners targeted to the target audience of the Politehnica University of Timișoara participated in the presentation of the results obtained in the project. On this occasion, the diplomas of "Home champion of sustainable consumption" were also handed to the winners of the competition. A second large event, promoted also through street advertising, radio and television shows was the conference organized under the aegis of the Timișoara University Alliance (ATU). This event, entitled "*Universities of Timisoara: education and action for sustainability*", attracted representatives of the four public universities in Timisoara, who presented their own projects and concerns related to sustainability in the academic environment. In their turn, representatives of public authorities, utilities providers and the economic environment joined the debate, highlighting extremely diverse concerns, but which aim, as a common goal, to ensure sustainable development and transform Timisoara into an innovation pole in terms of promoting sustainability in Romania.

The intended result was to ensure the visibility of the project, disseminate results, share good practices, exchange experience on the challenges of implementing projects related to sustainability and create synergy between local initiatives to promote the Sustainable Development Goals.

A 4.4. Greening campaign of the student campus "Eco-Poli"

The pre-project survey revealed a good knowledge of aspects related to climate change challenges among the student population, but also a poorly exploited potential for mobilizing students in projects related to environmental protection. More than a third of respondents answered "I don't know" to the question "What can you do for the environment?". Thus, the project team proposed and conducted (successfully) an extensive spring-cleaning action on campus, under the generic Eco-Poli.

The intended result was to illustrate ways of involvement in environmental issues and to increase the visibility of the project and the campaign slogan "I care".

3. The role of partners

The role of the Norwegian partner was to provide advice and mentoring on establishing the base line for the current situation at the Politehnica University of Timișoara regarding the knowledge and behavior of energy consumption, in a comparative perspective (Norwegian-Romanian), providing support for the training package for students and administrative staff, preparing the exchange of experience between the project promoter and relevant Norwegian institutions (universities), improving knowledge transfer between USE-REC project partners and participating in the preparation and evaluation of each major set of activities.

Project sustainability

In **the student population**, the trained vectors of change (students) will include in their plans, at the level of student leagues, provisions that stimulate pro-environmental behaviors and concerns. The project targeted 1000 students who appreciate having improved knowledge related to energy efficiency and sustainable energy use, reaching up to 13,000 students exposed to awareness messages on the topic. In addition, **trained administrative staff** involved in student services (20 people) will ensure energy monitoring and perpetuation of energy-saving behaviors in campus dormitories. Also, **the lease contract and the adopted regulations** will ensure the sustainable use of energy at student residences. Incorporating the project results into the university's experiences and practices ensures the snowball effect, which brings the ideals of sustainability closer together and makes the Sustainable Development Goals a lived reality.

3.2. Co-creating the vision and adopting the intervention strategy

Co-creating the vision and adopting the intervention strategy were important steps in the planification process, ensuring a collaborative approach tailored to the specific needs and conditions of the Politehnica University Timisoara. This process was based on the results obtained from focus groups and individual interviews, bringing together different stakeholders to formulate a comprehensive and effective strategy. The modality used was that of individual and group interviews.

The project team conducted individual interviews with members of the university management (rector, vice-rectors, administrative directors, and heads of key departments) to gain a detailed insight into institutional priorities related to energy consumption and resource management. These interviews provided a deep understanding of how the university manages its energy consumption on buildings and functionalities, while also identifying major consumption points and potential solutions envisaged to minimize waste.

The project team organized focus groups to collect opinions from dormitory administrators, as well as from students, inviting to discussion representatives of student leagues, heads of dormitories and heads of floors. These discussions provided broad insight into students' behaviors and attitudes related to energy consumption on campus. They also probed students' level of information on alternative energy sources, their willingness to implement energy efficiency solutions and their concerns about the responsible use of resources.

The next step consisted of the analysis of the gathered information and the identification of recurring trends and key concerns. This analysis contributed to the formulation of an integrative vision on the management of energy resources within the university, allowing the development of an intervention strategy based on real, up-to-date data. Following the obtained feedback, a vision shared by the main stakeholders was formulated, focusing on:

1. Reducing energy consumption through efficient and sustainable techniques.
2. Promoting a culture of responsibility towards resources within the university campus.
3. Integration of renewable energy sources into university infrastructure.

Based on this shared vision, the project team developed a detailed action plan, including deadlines, responsibilities and needed resources (existing or to be attracted additionally). This plan has been structured to ensure effective implementation of energy-saving measures and to promote sustainable practices within the student campus. A key component of the strategy was the development of a communication

plan to ensure that all members of UPT's student campus are informed and committed to the sustainability initiative. It included awareness-raising campaigns, training workshops and regular updates on the progress of initiatives.

The intervention strategy included a continuous monitoring system to track the progress of initiatives and signal whether adjustments had to be made, to overcome possible challenges. Constant feedback from the beneficiaries of the communication activities was essential to assess the effectiveness of the measures and to ensure that the objectives of the project were actually reached.

Politehnica University Timișoara has been pursuing for at least two decades the implementation of a culture of sustainability through its strategic plans (Șimon et al., 2020; Stoian et al., 2021), through research (for example through the model of "passive house", by studying the potential of solar energy in Romanian conditions, etc.), through investments (in the envelope of dormitories in the Student Complex, by purchasing class A ++ electrical appliances in dormitories, by replacing incandescent bulbs with more efficient solutions), by attracting projects aiming to reduce energy consumption (in the purchase of photovoltaic panels, project in pre-contracting phase in spring 2024). The USE-REC project offered the opportunity (and model) to promote the culture of sustainability among students, highlighting the importance of the human component in pursuing the Sustainable Development Goals. The tested integrated and integrative approach will contribute to a more environmentally responsible future for the university community and for the city.

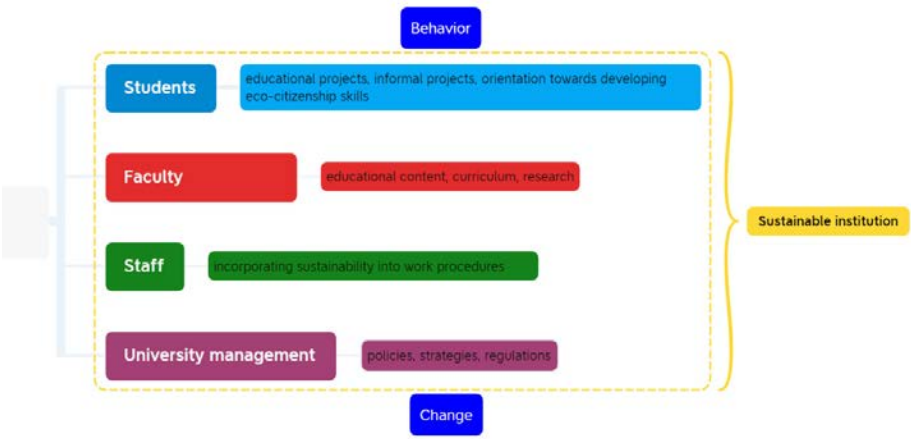


Figure 1. Model of integrated, transformative approach to achieve sustainability goals.

The model aligns with international best practices, which mobilize the academic community – composed of students, teachers, administrative staff, academic management – around the principles of sustainability, through topics and actions specific to each category of audience, to determine those transformations that lead to the goal of making the university an authentically sustainable institution.

The perspective of the institution's representatives, students, and dormitory administrators on sustainable energy consumption on the student campus

To find out the perspective of stakeholders on sustainable energy consumption through field research, we used the method of individual interviews and group interviews. The individual interviews were carried out in inquiries of the university management, while dorm administrators and students were called upon via group interviews. The issues under discussion referred to the UPT university campus, with details covering the student residential area. The main directions of the study were: electricity consumption; water consumption; heat consumption; separate waste collection; ways to alert or inform on-campus students, methods, measures, or activities suited best for developing sustainable behaviors in the student population.

The interview guiding the debate consisted of the following questions:

For sustainable electricity consumption

1. What appliances or equipment do you consider to be large consumers of electricity in student dormitories?
2. Do you think there are time intervals during the day when electricity consumption is higher? What about during the year?
3. Are students mindful of their electricity consumption? Are there measures taken to prevent electricity waste? If so, what are they?
4. What are the behaviors that you consider to be responsible for high electricity consumption in student dormitories? What changes should be made in student behavior to optimize electricity consumption?
5. What strategies or solutions do you consider to be effective to reduce electricity consumption in student dormitories?

For sustainable water consumption

6. What are the main sources of water consumption in student dormitories?
7. Are students mindful of their water consumption? Are there measures taken to prevent water waste? If so, what are they?

8. What behaviors do you consider responsible for high water consumption in student dormitories? What changes should be made in student behavior to optimize water consumption?
9. What strategies or solutions do you consider to be effective to reduce water consumption in student dormitories?

For sustainable heat consumption

10. Is there an individual temperature control system in students' rooms to avoid excessive heating or cold?
11. Are students paying attention to heat consumption? Are there measures taken to prevent heat waste? If so, what are they?
12. What are the behaviors that you consider to be responsible for high heat consumption in student dormitories? What changes should be made in student behavior to optimize heat consumption?
13. What strategies or solutions do you consider to be effective to reduce heat consumption in student dormitories?
14. What other alternative heating sources can be considered to reduce energy consumption and have less impact on the environment?

For separate waste collection

15. What changes should be made in student behavior to optimize separate waste collection?
16. What strategies or solutions do you consider to be effective for students to dispose of the garbage in specially designed bins?

For promotion/warning sustainable energy consumption in student dormitories

17. How do you think information on responsible energy use among students (water, electricity, heat) could be promoted?
18. How do you think awareness and behavior change about responsible energy use among students (water, electricity, heat) could be achieved?
19. What are the main barriers you see in implementing energy-saving solutions (water, electricity, heat)?
20. What would be the way in which the lease contract of students residing in dormitories could be improved to make them aware and responsible about sustainable energy consumption?
21. Is there anything you wanted to say that you did not have the opportunity to do?

Conclusions of the interviews with university management regarding the sustainable energy consumption on campus

The results of individual interviews are presented along the main directions of the study.

I. Size of electricity consumption

- The perception of the interviewees is that students, in general, do not pay attention to unjustified electricity consumption, and this attitude often comes from their home education.
- The highest electricity consumption, according to records, is encountered in the evening, at night and in wintertime.
- The appliances using electricity in dormitories are washing machines, electric hobs, refrigerators, laptops, coffee makers, microwave ovens and other equipment that students still use.
- In the case of washing machines, students use excessive electricity by not filling the washing machine to full capacity and performing a larger number of washes than necessary, relative to the volume of washed laundry.
- It is difficult to harmonize electricity consumption in dorm rooms where four or more students live, each of whom has a different personality, different educational background, etc.
- There are no electricity meters in the rooms and there is no limitation of electricity consumption per room or per student.
- There are buildings in UPT with higher electricity consumption; these are usually associated with the existence of computer servers.

Actions taken in the university to optimize electricity consumption.

- The action of a teacher with a group of PhD students to map electricity consumption in UPT buildings.
- Replacement of electrical wiring installation in some dormitories and academic buildings.

Measures to be taken for sustainable electricity consumption.

- Development of a strategy for the use of renewable energy at UPT level.
- Replacing energy-intensive bulbs with LED solutions.
- Placing photovoltaic panels on buildings suitable for this technical solution.
- Development of a green area and an underground parking lot around UPT Sports Base 1.
- Raising student awareness through actions highlighting sustainable energy consumption. Student organizations can play leading roles.

- University representatives prefer awareness initiatives to punitive measures.
- Educational actions must also target the lower levels of education, even kindergarten children.

II. Size of water consumption

- The perception of the interviewees is that students are not aware and do not pay attention to unjustified water consumption. The reasons are multiple: the fact that Romania is rich in soil and subsoil water resources, education, etc.
- During the cold season, students have the habit of leaving the showers turned on and returning after a long time to the purpose they have set.
- The technical department makes a careful monitoring of UPT consumption for all types of energy.
- Many of the dormitories were overhauled and the old pipes were replaced with copper pipes. There are still areas in some dorms that need refurbishing, but it is to be solved in the current year (2024).

Proposed solutions for optimization/reduction of water consumption

- Sensor valves, like in big stores. This solution requires large investments.
- Organizing resource awareness events such as: *World Drinking Water Day*, *Water Day,* etc.

III. Size of heat consumption

- Each dormitory has its own central heating system, except for dormitory 1MV which is connected to the central station, providing heating also to the Faculty of Mechanics pavilion.
- Most dormitories are thermally enveloped and have minimal losses, and the institution's buildings have double-glazed windows.
- Heat consumption is high in buildings that do not benefit from thermal insulation. For example, the Faculty of Mechanics, a historic building, would require considerable financial investment to be thermally insulated.

Measures to optimize/reduce heat consumption.

- Dormitories that still have a high consumption of thermal energy will be able to enter a generic energy rehabilitation process, with external financing.

IV. Dimension of separate waste collection

- It is one of the thorniest sustainability issues in the university.

- In the lease agreement there are provisions related to the separate collection of waste that students claim to have read, but the effects of these provisions prove to be minimal during monitoring activities.
- No effective control measures are in place to observe the correct use of the garbage bins. Therefore, although some students use these bins correctly, others do not follow this practice, rendering efforts ineffective.
- As alternative solutions, the models adopted in other university centers, such as those in Cluj Napoca, are proposed. It is noteworthy that in Cluj Napoca University Center, selective waste collection is carried out differently, through underground bins, due to investments made by local authorities. In Timisoara, we do not have such an infrastructure and we cannot talk about this selective collection mode (yet).

V. Ways of promoting/informing/warning

- Each UPT student has a personal email, provided by the university.
- Students have Facebook, Instagram and TikTok pages at their disposal to access the information dedicated to them.
- Various awareness campaigns are carried out in UPT, through communication channels managed mainly by student associations.
- Most interlocutors prefer educational, informative, and awareness-raising actions to punitive ones, especially in the context of an educational institution that relies exclusively on such means.
- Events linked to sustainability topics were proposed, such as a green weekend at UPT.
- The university management proposes that good practices on sustainability, developed in the relationship with students, be extended to the administrative staff, i.e., non-teaching or auxiliary teaching.
- Development of a separate collection infrastructure that can lead to sustainable behavior.

The perspective of student representatives and dormitory administrators on sustainable energy consumption on campus

Group interviews were conducted with the following categories of people:

- Students and student representatives living in UPT dormitories.
- Administrators of dormitories where UPT students live.

The conclusions of student representatives and dormitory administrators on sustainable energy consumption on the student campus are presented along the four dimensions of analysis.

I. Size of electricity consumption

- The statements of the interviewees indicate that students are not careful with electricity consumption in a sustainable sense.
- In some cases, home-acquired habits include leaving appliances turned on; most often such situations involve laptops left unattended in rooms, while users move to other spaces, such as the kitchen or study room, for various activities.
- One of the administrators even advanced the approximation that only 5% of students pay attention to sustainable electricity consumption.
- Electricity consumption is influenced by each appliance plugged in and used by students:
  - electric hobs, washing machines, hair dryers, microwave ovens, refrigerators, fans in summer, television sets.
  - Kitchen light bulbs are often left on, being turned off only on a few occasions.
  - bulbs on modules that are switched on continuously, i.e., are used not only when necessary, but also when they are not needed.
- The peak of electricity consumption is reached:
  - between 17.00 and 23.00 and in winter when natural light consumption is lower.
  - in the periods after repairing washing machines that have broken down when students wash a lot.
  - during the hours when students prepare their food, i.e., lunchtimes or evenings.

Measures to prevent waste of electricity.

- Installation in certain places of motion sensors associated with electrical switches.
- Presenting examples of good practices regarding electricity consumption on the bulletin boards of dormitories.
- Reducing in some dormitories the number of neon tubes in rooms, from four to two, on each luminaire of this type.

Recommendations for sustainable electricity consumption

- Adjustment of the accommodation monthly tariff according to electricity consumption.
- Establishing a maximum number of washes at the washing machine on the floor, a method implemented in several dormitories.
- Unplugging unused electrical appliances or devices.

- Turning off light bulbs in bathrooms and hallways when they are not in use, and more importantly, during student holidays when dorms are not inhabited.
- Monitoring electricity consumption by modules.
- Promoting sustainable consumption messages in more creative ways, so that students are stimulated to change their behavior.
- Awareness raising discussions between heads of dorm floors with their own colleagues on this topic.

II. Size of water consumption

- All participants said that students do not pay attention to sustainable water consumption or that they are not interested in saving money at this age.
- The main sources of *excessive* water consumption in student dormitories:
  - Unattended showers with water flows without being used for a specific purpose.
  - Excesses on the part of some students who take exceedingly long showers.
  - Washing machines are used often, without filling them to their maximum capacity.
  - Faucets in kitchens left open without precise use.

Measures applied in some dormitories to prevent water waste.

- Existence of timers for showers in dormitory 19.
- Existence of a program for using washing machines (dormitory 7).
- Greater involvement of dorm or building managers to ensure compliance with the established schedule for the use of washing machines.

Strategies or solutions considered to be effective to reduce excessive water consumption in student dormitories.

- Restoration of electrical installations and automation.
- Installation of sensors, like those found in large stores or parking lots.
- Accountability messages in a way that appeals to students.
- A reward or punishment system.
- Constant information of the head of dormitory and administrator.

III. Size of heat consumption

- The existence of old radiators that do not allow temperature regulation.
- Heating is provided centrally, and temperature regulation is done also only centrally.

- Heating installations in some dormitories are old, and heating is carried out unevenly across floors. Thus, on the upper floors it is very hot, and on the ground floor it is very cold.
- In the winter holidays, when heating could be reduced, this cannot be done because of a lack of infrastructure.

Students' attention to heat consumption

- They do not pay much attention because they cannot regulate the room temperature, since the heating system is centralized and controlled only from the central point.
- If the temperature in the boiler were to drop, there is a risk that students would bring alternative heating sources into their rooms.

Strategies or solutions considered to be effective to reduce heat consumption in student dormitories.

- Thermostats, new radiators, better sealed windows, investments in product quality.
- Establishing a program for heat supply in dormitories.
- Change of heating system.
- Accustoming students, even from the beginning of the cold season to somewhat lower temperatures in rooms and not maintain it at 22–23 degrees, that allow them to wear T-shirts round the year.
- Organizing meetings on the dorm floors to consult students and decide what temperature is optimal in the rooms.
- Alternative heating sources that can be considered to reduce thermal energy consumption: solar panels, radiant panels, tube installations, etc.

IV. Dimension of separate waste collection

State of facts in separate collection:

- The general opinion of students and administrators is that students, for the most part, do not know how to collect selectively.
- There are dormitories where selective collection works better because the outdoor space of the dormitory allows better organization.
- In dormitories where administrators are actively involved, most students follow selective collection rules.
- On the floors there are presses for PET bottles.

Solutions proposed by participants in group interviews to improve separate collection:

- Training students in the spirit of selective collection because in some of the localities where students come from, selective collection is not done and therefore they do not have prior experience with these matters.
- Separate collection should also be carried out in faculty buildings.
- Installation of recycling devices following the model of large stores.
- Installation of bins for selective collection on each floor.

The main barriers perceived by interviewees in implementing energy-saving solutions (water, electricity, heat) or selective collection of waste.

- Ignorance and lack of information of students.
- Reduced investment in the modernization of dormitories.

Ways to alert and develop sustainable behavior among students.

- Information campaigns with the involvement of student leagues.
- Involvement of heads of dormitories and heads of floors of dormitories.
- Empowering and raising students' awareness about sustainable energy consumption through the lease contract.
- Dorm administrators to be more involved.
- Rewards and/or penalties for students.

4. DIAGNOSIS: INSIGHTS ON SUSTAINABILITY REGARDING CAMPUS LIFE

Vasile Gherheș, Mariana Cernicova-Bucă,
Gabriel-Mugurel Dragomir and Adina Palea

4.1. Awareness and sustainable practices specific to the young generation

In Romania, most universities provide accommodation in dormitories as a means of facilitating access to education for wide categories of youth. At UPT, students pay a flat rental fee, regardless of consumption of utilities, at a reduced tariff, part of the accommodation costs being subsidized by the university. The dormitories have communal laundries equipped with washing machines and communal kitchens equipped with electric hobs. There are refrigerators in each room, and students bring with them portable appliances and devices such as laptops, hair dryers, irons, water heaters, TV screens, fans, etc. Municipal services provide utilities (water supply and waste management). Electricity is provided by specialized suppliers designated under national regulations. Most thermal energy comes from gas boilers, provided by the university.

The sociological inquiry played a key role in observing and studying the behavioral dynamics of students concerning energy consumption The data allowed researchers to have a complex and nuanced picture, contributing to the development of more effective policies and practices of energy resource management within the university. The research focused on the campus of Politehnica University Timisoara, Romania. Out of approximately 13,000 students studying at Politehnica, more than 6,000 opt to live on campus. Of the 16 student dormitories, two were excluded from the study because they are reserved for faculty and doctoral students, who differ from most campus residents by age, professional and financial status, space occupancy and length of lease.

The research team used the sociological questionnaire as a tool for data collection. Questionnaires are frequently used to gather data on energy consumption, as shown by studies conducted by Deme Belafi et al. (Belafi, 2018). In formulating

the questions, the research team drew inspiration from both the scientific literature and from the set of questions developed by the World Bank and the World Health Organization to measure the use of the world's energy resources (Core Questions for Household Energy Use, n.d.; Special Eurobarometer 513: Climate Change – Data Europa EU, n.d.; Debrah et al., 2021; Gherheș et al., 2021; Gherheș & Fărcașiu, 2021). The questionnaire allowed not only to identify the frequency of use of electrical appliances, but also to deeply analyze attitudes and perceptions related to energy and water consumption, waste management and other practices which bear an effect on sustainable housing. Special emphasis was placed on students' awareness of the impact of their actions on energy consumption and on their strategies to minimize energy costs and reduce their environmental impact. The questionnaire included questions that rated the frequency of certain behaviors on a scale from 1 ("never") to 6 ("daily"), with option 7 allowing for non-response, rated 0. Environmental behaviors were measured on a 5-point Likert scale, from 1 ("never") to 5 ("always"). The questionnaire ends with a set of socio-demographic questions regarding the age, gender, and residence status of the participants.

To ensure the validity of the questionnaire, the Cronbach Alpha coefficient was calculated on a test sample. Cronbach's alpha quantifies the level of agreement on a standardized 0 to 1 scale (Cronbach – 1990 – Essentials of Psychological Testing, n.d.). Higher values indicate higher agreement between items, proving the reliability and internal consistency of the questionnaire (Howitt & Cramer, 2008; Tabachnick et al., 2013). The Cronbach Alpha coefficient for the created questionnaire indicated values above 0.7, which is considered acceptable for research (Tabachnick et al., 2013), indicating a solid internal consistency of the selected elements and facilitating the performance of factorial analyses.

To pursue the goal of determining energy consumption and student behavior, it was essential to create a balanced and representative sample. To this end, the research team chose to distribute the questionnaire through a method that maximizes participation and ensures diversity of responses. The questionnaire was disseminated online, using the online communication channels of administrators and student representatives in dormitories (heads of dormitory or floor), who are in direct and constant contact with students residing on campus. They have direct access to each dorm's WhatsApp groups, which function as primary communication platforms for student announcements and discussions. The use of these groups allowed the questionnaire to be disseminated quickly and efficiently, thus ensuring that it reached many students in a relatively short time. In addition, this method also facilitated a higher response rate, since students tend to be more receptive to information distributed through familiar and trusted channels.

In addition, to expand the coverage and to ensure the demographic diversity within the sample, the link to complete the questionnaire was also distributed through the communication networks of the university's 10 student leagues. These leagues, representing different faculties and academic interests, have their own communication channels and social network accounts, used to engage students in various activities and initiatives. By accessing these channels, the research team was able to reach diverse segments of the student population, from newcomers to doctoral students, each with potentially different energy consumption behaviors.

The direct and personalized approach in communicating with students has improved the level of involvement and their interest in participating in the survey, thus increasing the quality and accuracy of the obtained data. In the end, a number of 1023 students from the Politehnica University of Timisoara, coming from all years of study, participated in the study. Since the university schools approximately 13,000 students, the calculated margin of error was ±3.3%. Participation was voluntary and measures were adopted to protect respondents' confidentiality.

Starting from the premise that students are not only participants in the educational process, but also actors in a university ecosystem that promotes sustainability and responsible management of resources, this study aimed to assess to what extent student behavior influences and reflects sustainability principles applied to campus life. Focusing on various aspects of daily life in student dormitories, the research aimed to identify and analyze efficient practices and possible areas for improvement.

The objectives of the study were:

- To investigate students' perceptions and behaviors related to environmental protection and to identify the factors that influence these attitudes;
- To analyze electricity consumption management practices in UPT dormitories;
- To define electricity saving behaviors in UPT student dormitories;
- To investigate water saving behaviors in UPT student dormitories;
- To study waste management behaviors and practices, including waste sorting and disposal techniques in UPT student dormitories;
- To examine recycling practices in UPT student dormitories;
- To analyze the integration of ecological practices into students' daily routine and in their educational environment;
- To investigate the ways in which students contribute to resource conservation and environmental protection.

The results of the sociological study, corroborated with the monitoring of electricity, heat and water consumption in dormitories (based on consumption records, but also on the invoices issued by suppliers) allowed the creation of a

profile of the student-consumer of household utilities, which was the basis of the transformative intervention, set as the main objective of the project (Cernicova-Bucă et al., 2024 a). In summary, the research approach is represented as follows:

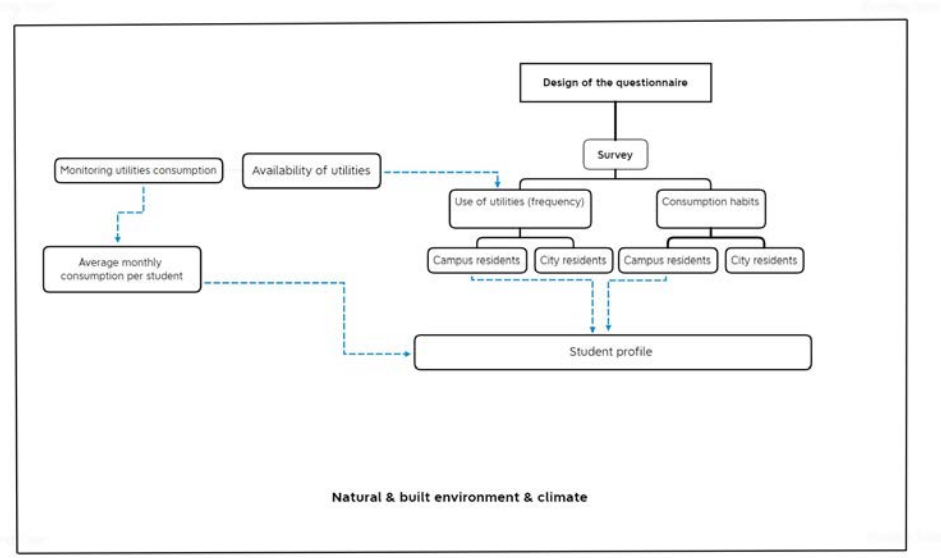


Figure 1. Conceptual design of research

The described approach created the possibility of accumulating a rich pool of data, which allowed a data-driven design of the campaigns aimed at influencing behaviors and the elaboration of information and persuasive messages tailored for the purposes stated as pertaining to the project.

The detailed sections below present the results of the survey. Each section reflects a specific aspect of students' sustainable behaviors and practices, from managing energy consumption to active involvement in environmental protection.

1. Awareness and action: perspectives and commitments of students from the dormitories of Politehnica University of Timișoara (UPT) regarding environmental protection

The section contains information on:

- Awareness of environmental protection issues
- Importance attached to environmental protection
- Concerns about environmental issues
- Individual actions for environmental protection

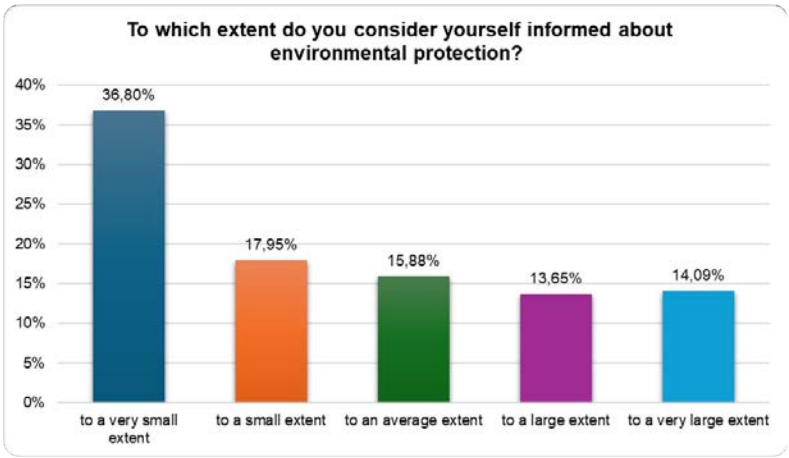


Figure 1.1. Degree of information concerning environmental protection

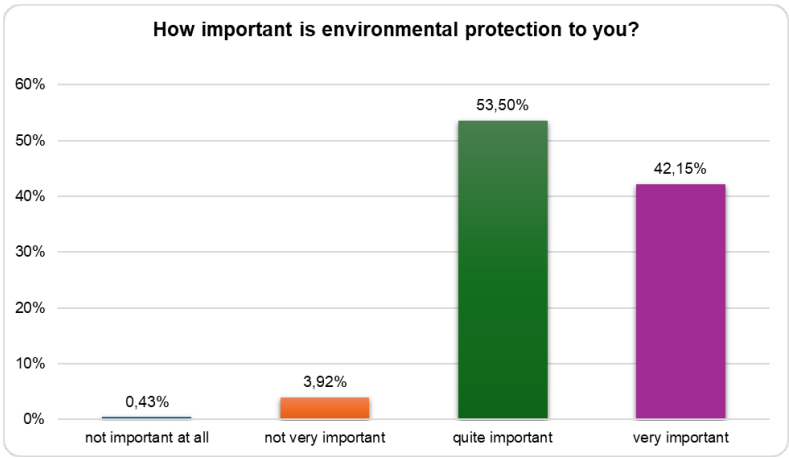


Figure 1.2. Importance attached to environmental protection

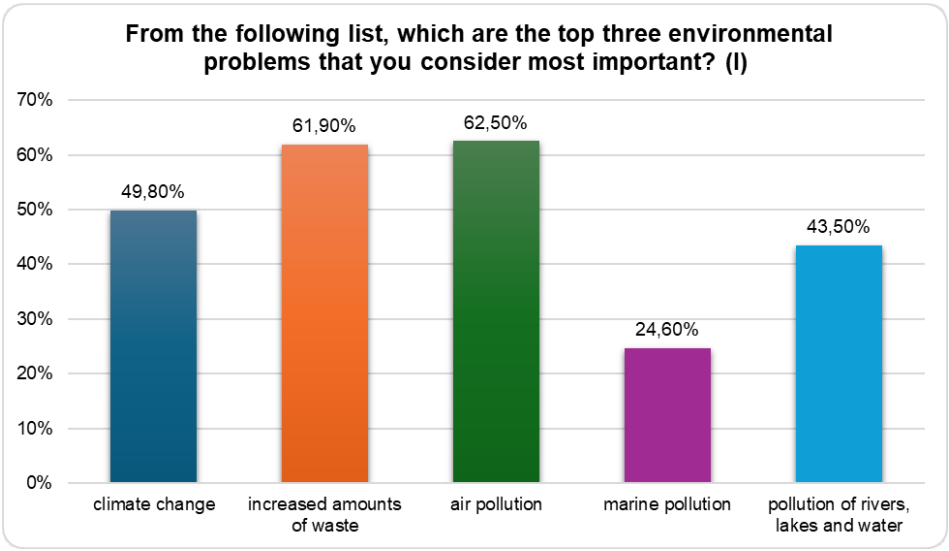


Figure 1.3. Concerns about environmental issues (I)

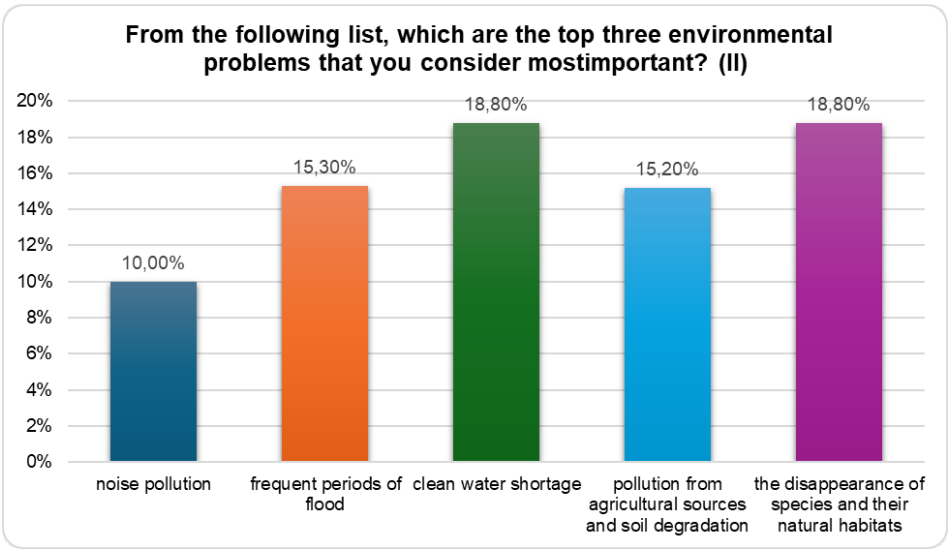


Figure 1.4. Concerns about environmental issues (II)

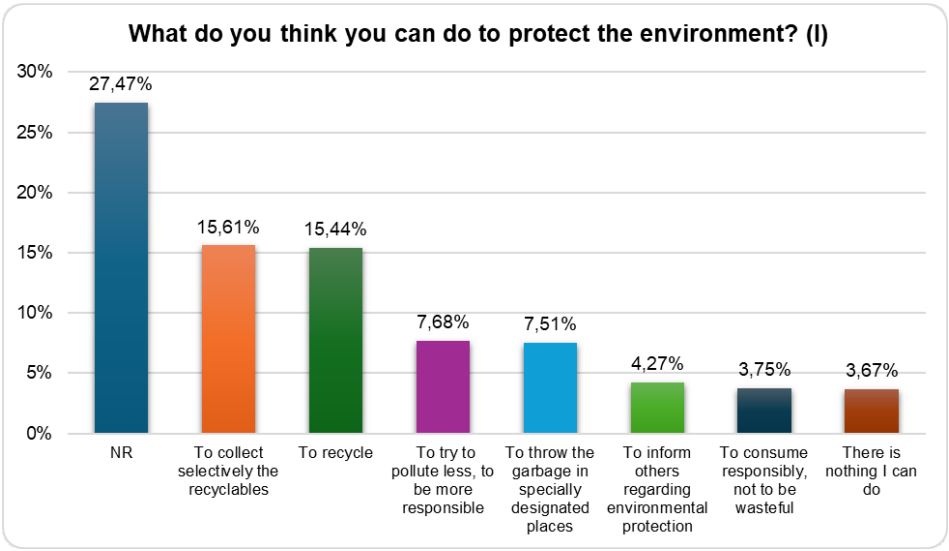


Figure 1.5. Individual actions for environmental protection (I)

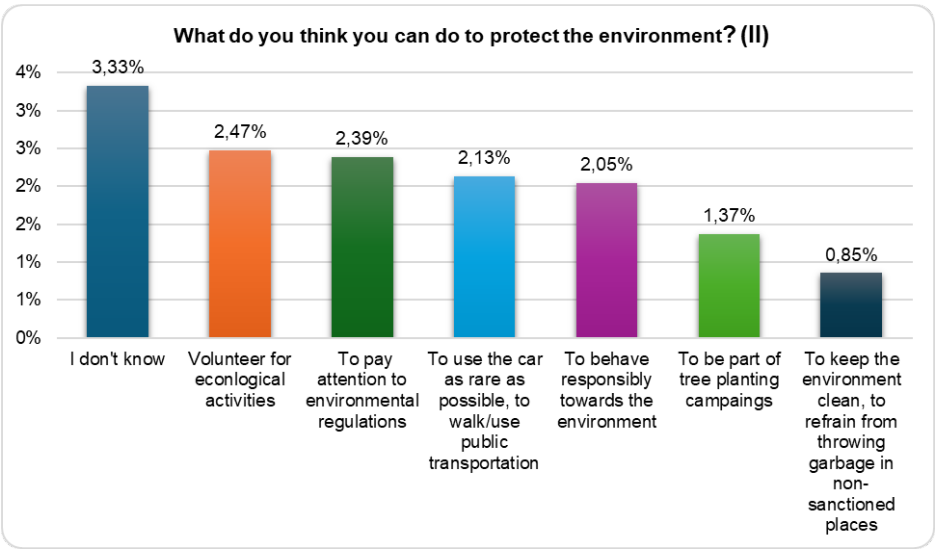


Figure 1.6. Individual actions for environmental protection (II)

Results in brief

Awareness of environmental protection:

- Most respondents (43.3%) consider themselves informed to an average extent about environmental protection. A significant proportion of the sample (30.3%) feel informed regarding environmental protection to a large extent, and 12.1% to a very large extent, suggesting that there is a well-informed and possibly active group in the field of environmental protection. A smaller minority (3.8% to a very small extent and 10.5% to a small extent) consider themselves poorly informed.

Importance given to environmental protection:

- Most respondents consider environmental protection to be quite important (53.5%) or very important (42.2%), reflecting a high value placed on this aspect. Only a small fraction of the sample considers environmental protection to be not at all important (0.4%) or not too important (3.9%), suggesting that almost all participants attach some level of importance to environmental protection.

Perception of environmental issues:

- Air pollution is considered to be one of the most important environmental problems, with 62.5% of respondents selecting this option. Increased amounts of waste are also of major concern, with 61.9% of respondents considering the issue to be important. Deforestation is identified as a key issue by 56.8% of participants.
- Other environmental issues, such as climate change (49.8%), are also recognized as significant, but to a somewhat lesser extent compared to the first three.
- Issues such as marine pollution, pollution of rivers, lakes and groundwater, and drinking water scarcity are also receiving significant attention, reflecting an awareness of the importance of clean water and aquatic ecosystems for human health and the environment.
- By contrast, noise pollution, frequent periods of floods and droughts, and pollution from agricultural sources and soil degradation are considered less important compared to other environmental problems.

Perceptions and actions for environmental protection:

- Separate collection of recyclables and recycling are the most frequently mentioned concrete actions that people believe they can undertake to protect the environment, each with about 15.6% and 15.4%.

- Other actions mentioned include trying to pollute as little as possible and be more responsible (7.7%), throwing garbage in specially designated places (7.5%), informing other people (4.27%), responsible consumption to avoid waste (3.8%).
- Volunteering for greening actions (2.5%) and participating in tree planting campaigns (1.4%) are also recognized as valuable contributions, although they are mentioned less frequently.
- Interesting to note is the fact that 4.3% of respondents see informing others about environmental protection as an important action, indicating that students believe in the power of education and awareness in promoting behavior change.
- A small percentage of respondents (3.67%) believe they can do nothing to protect the environment, and a significant proportion of respondents (27.47%) did not provide a specific answer, which may indicate uncertainty, lack of awareness or indifference to individual environmental protection actions.

Associated research

While the data in this section highlight the awareness of on-campus students with respect to environmental issues and their readiness for action, a whole-institution approach needs to also analyze the students who have different living arrangements (living with parents, renting independently, etc.). Such a view is offered by the article Cernicova-Buca, Mariana, Gabriel-Mugurel Dragomir, Vasile Gherheș, and Adina Palea. 2023. "Students' Awareness Regarding Environment Protection in Campus Life: Evidence from Romania" *Sustainability* 15, no. 23: 16444. https://doi.org/10.3390/su152316444. The article presents the influence of place of residence and gender on the students' perceptions and behaviors and helps visualize the specificity of this major stakeholder that cannot be dealt with as a monolith. A genuine transformative effort needs to acknowledge the differences and propose directions for action tailored according to students' interests, predispositions, and knowledge.

2. Awareness and sustainable practices: managing electricity consumption in UPT dormitories

The section contains information on:

- Attention paid to energy consumption
- Level of information about energy consumption of the electric appliances
- Frequency of use of the refrigerator
- Frequency of use of the washing machine
- Frequency of use of the electric hob
- Frequency of use of the iron
- Frequency of use of hair dryer
- Frequency of use of computer/laptop/printer
- Frequency of use of air conditioning
- Frequency of use of the electric radiator
- Frequency of use of the dishwasher
- Frequency of use of the vacuum cleaner
- Frequency of use of the hair straightener/curling plate
- Frequency of use of the electric kettle
- Frequency of use of the toaster

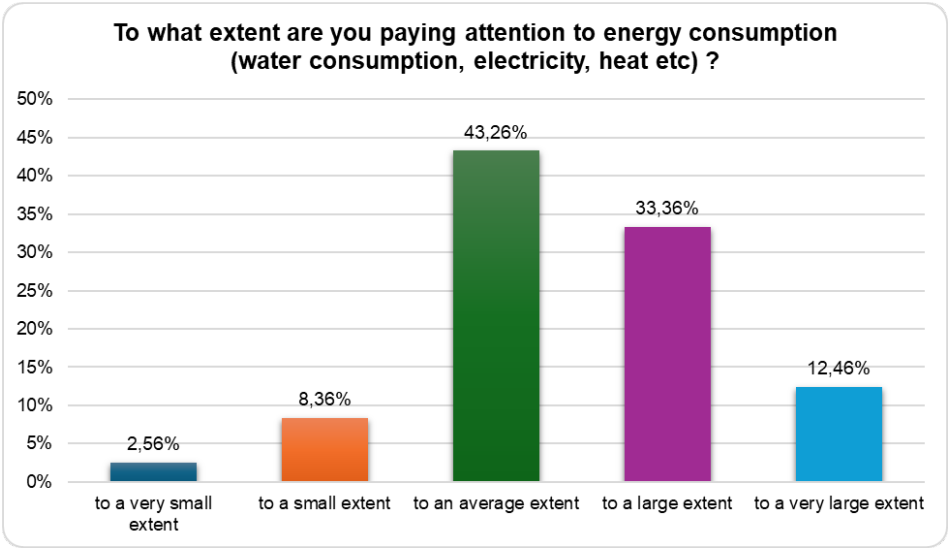


Figure 2.1. Attention paid to energy consumption

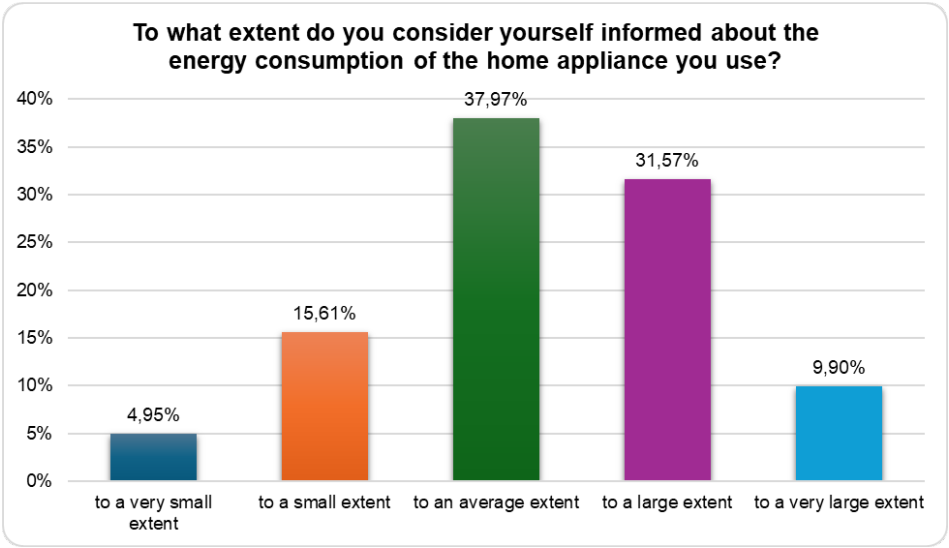


Figure 2.2. Level of information about energy consumption of the electric appliances

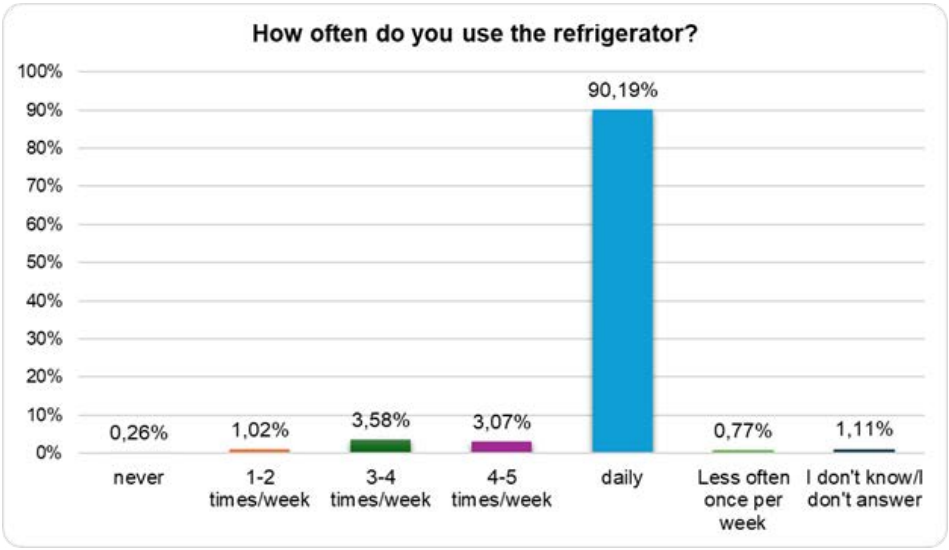


Figure 2.3. Frequency of use of the refrigerator

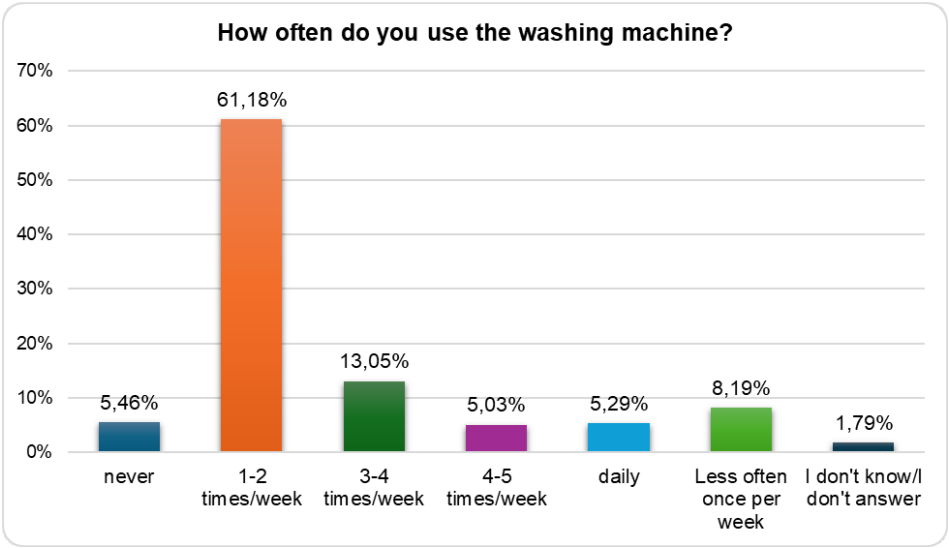


Figure 2.4. Frequency of use of the washing machine

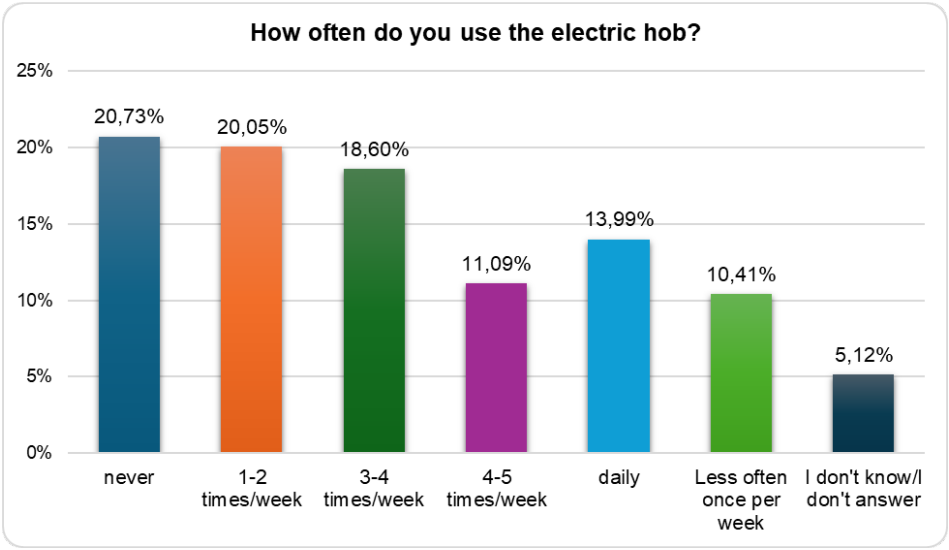


Figure 2.5. Frequency of use of the electric hob

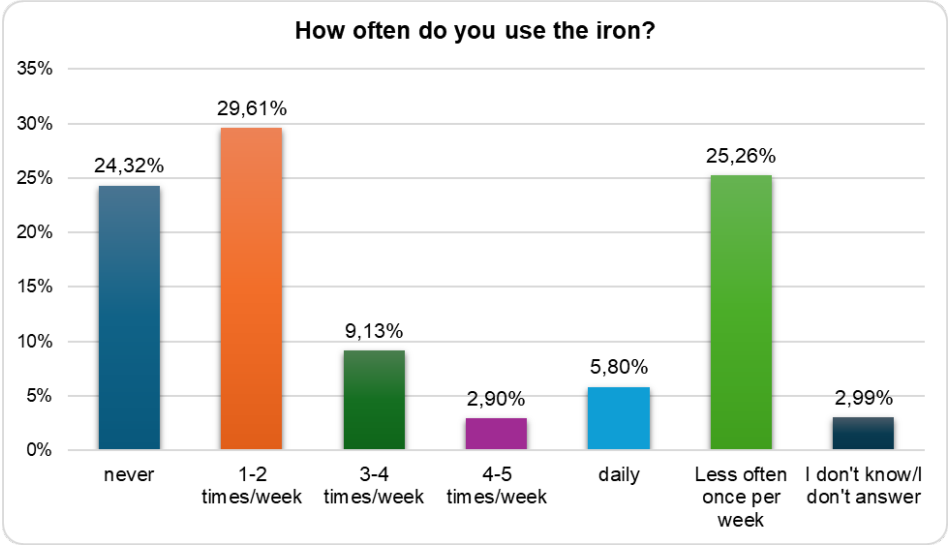


Figure 2.6. Frequency of use of the iron

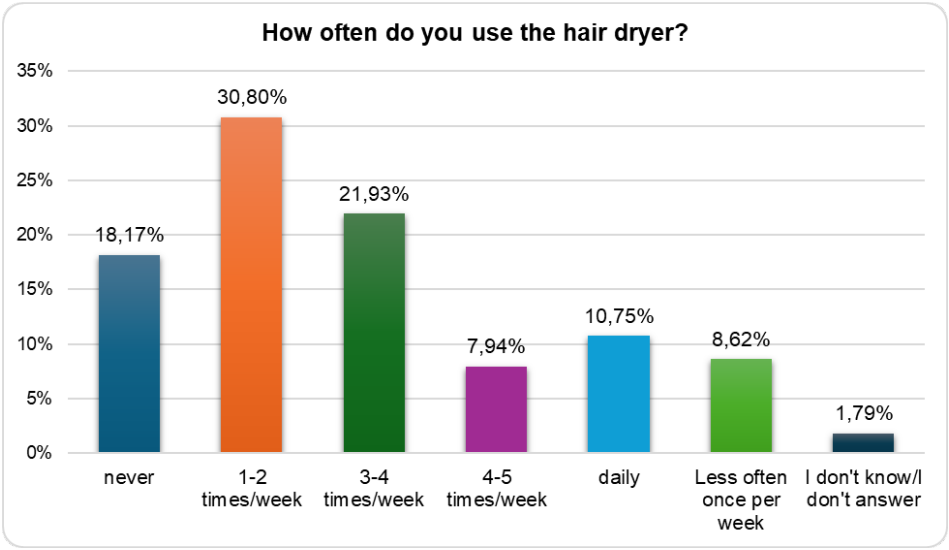


Figure 2.7. Frequency of use of the hair dryer

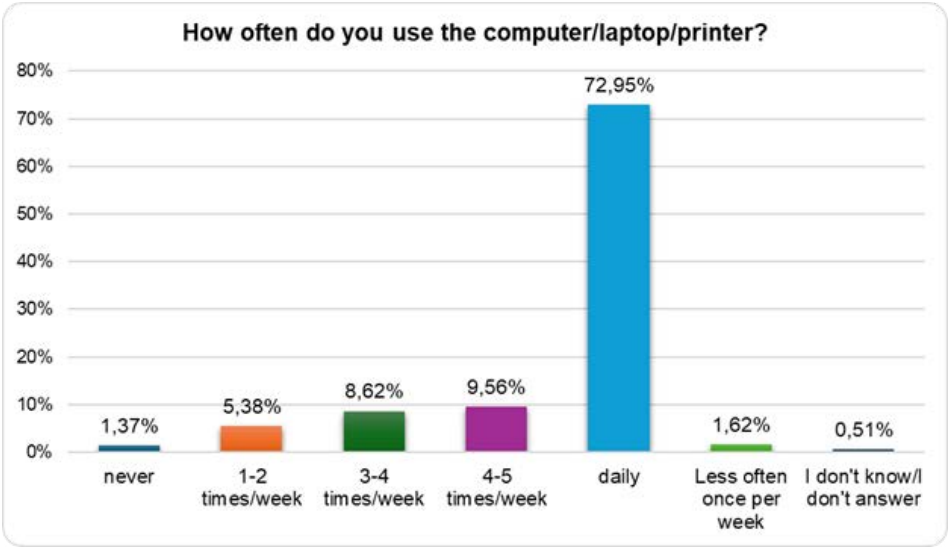


Figure 2.8. Frequency of use of the computer/laptop/printer

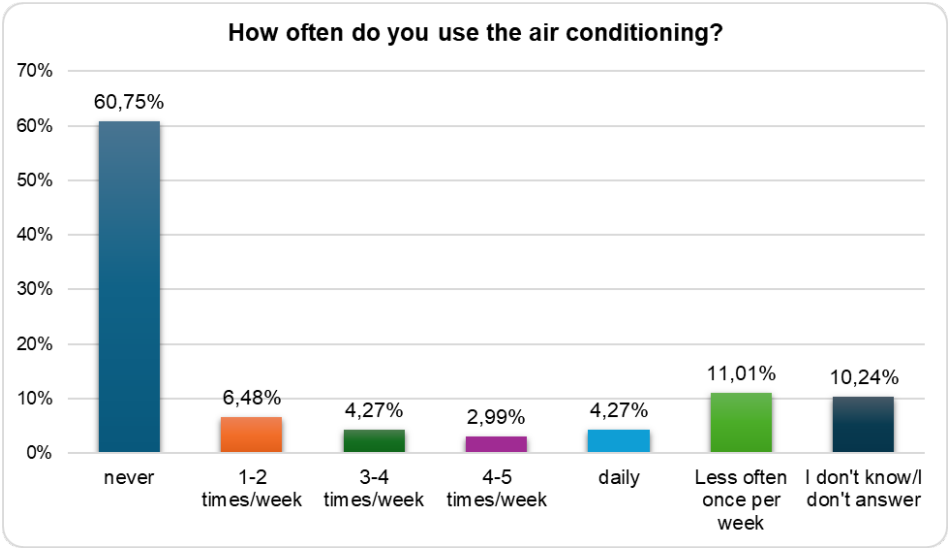


Figure 2.9. Frequency of use of the air conditioning

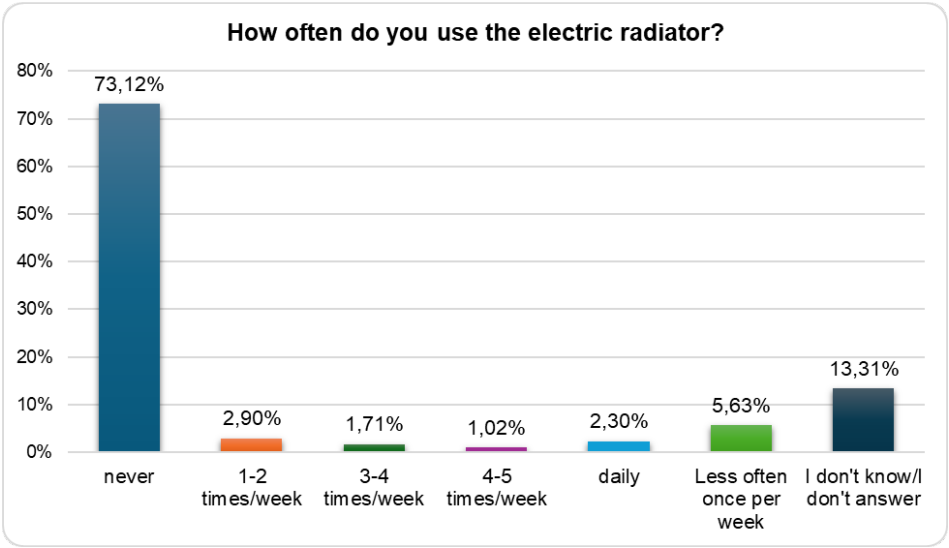


Figure 2.10. Frequency of use of the electric radiator

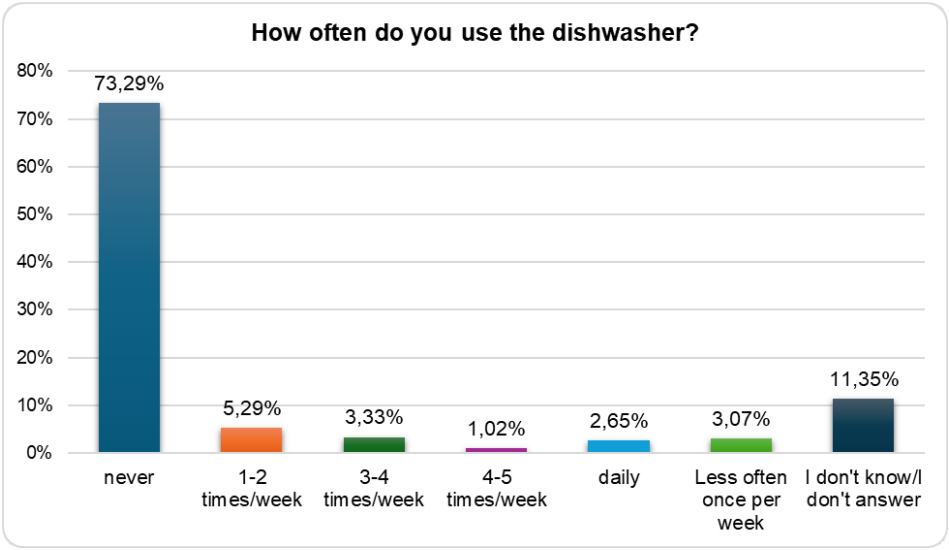


Figure 2.11. Frequency of use of the dishwasher

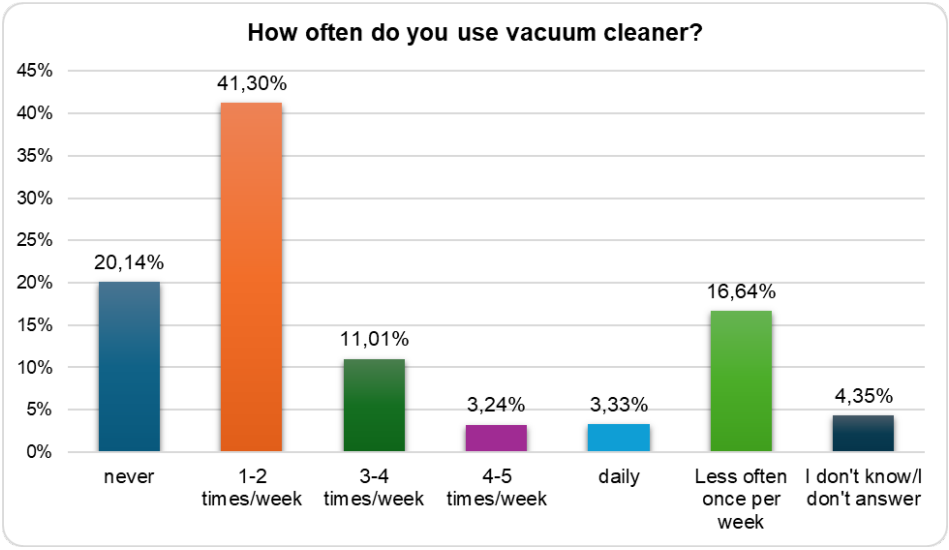


Figure 2.12. Frequency of use of the vacuum cleaner

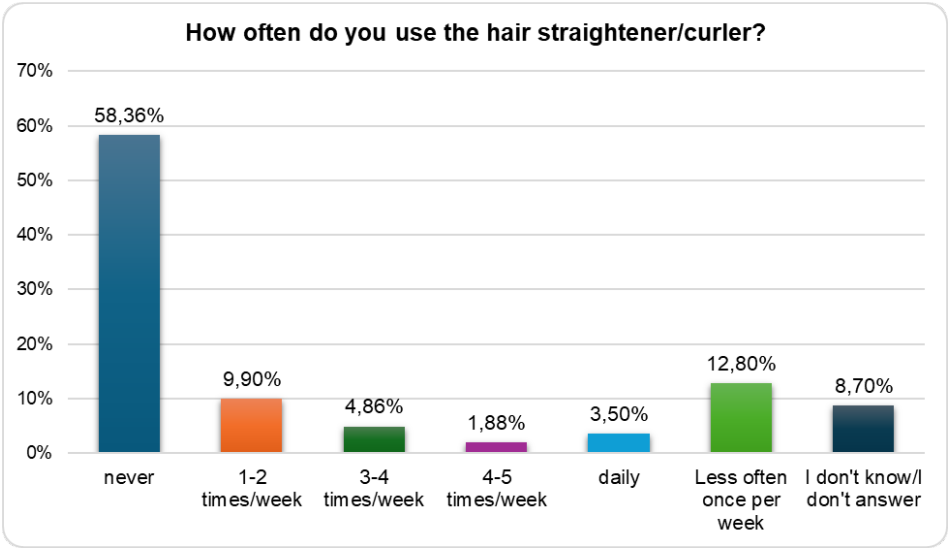


Figure 2.13. Frequency of use of the hair straightener/curler

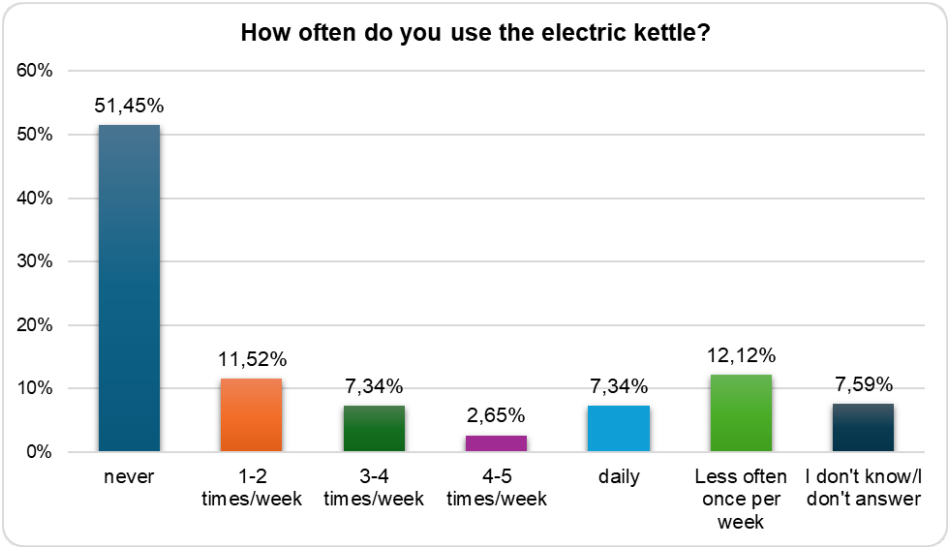


Figure 2.14. Frequency of use of the electric kettle

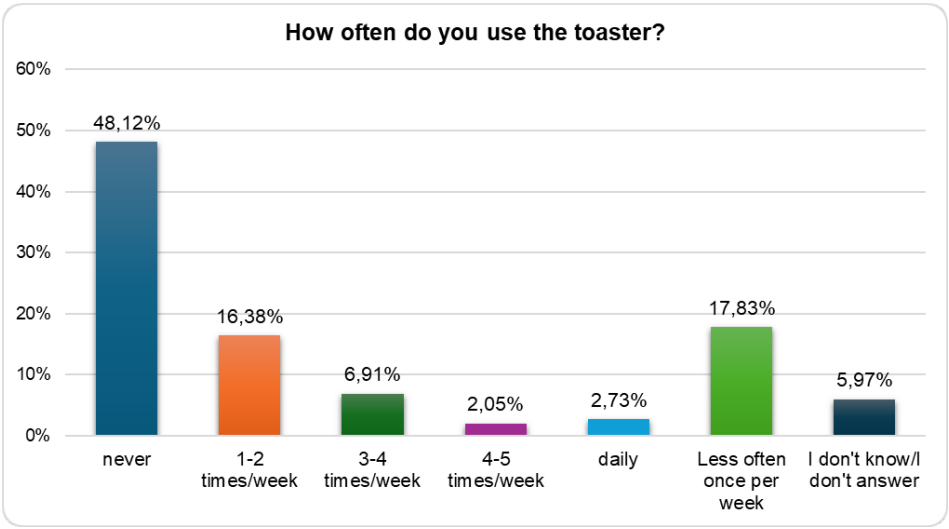


Figure 2.15. Frequency of use of the toaster

Results in brief

Attention paid to energy consumption:

- Most respondents, 43.3%, pay attention to energy consumption to an average extent. A significant proportion, 33.4%, are largely attentive, and 12.5% declare that they pay attention to a very large extent to the consumption of water, electricity, heat, etc.
- A small minority of respondents, 2.6%, indicate that they pay attention to energy consumption to a very small extent, and 8.4% that they pay attention to their consumption behaviors to a small extent.

Level of information about energy consumption of the electric appliances:

- A total of 20.5% of participants (4.9% to a very small extent and 15.6% to a small extent) consider themselves little or not informed at all about the energy consumption of the appliances they use.
- Most respondents, 38.0%, consider themselves informed to an average extent, indicating a general awareness of the importance of energy consumption, but possibly without a deep or detailed understanding of the energy specifications of their appliance.

- A significant proportion of 31.6% feel largely informed and 9.9% very largely informed, reflecting a segment of the population that is well informed and probably pays close attention to choosing and using energy-efficient appliances.

Frequency of use of household appliances:

1. Refrigerator:
- The overwhelming majority of respondents (90.2%) use the refrigerator daily, reflecting its status as an essential appliance in households.

2. Washing machine:
- Most respondents (61.2%) declare they use the washing machine 1–2 times a week, indicating regular, but not daily, use.

3. Electric hob:
- The use of this appliance is more evenly distributed, with 20.7% of respondents never using it and 20.1% using it 1–2 times a week.

4. Iron:
- A significant proportion (24.3%) never use an iron, and 29.6% of respondents declare they use it 1–2 times a week.

5. Hairdryer:
- The distribution is varied, with 18.2% of respondents never using it and 30.8% using it 1–2 times a week.

6. Computer/laptop/printer:
- A large majority (73%) of respondents use these devices daily, highlighting the importance of IT equipment in student everyday life.

7. Air conditioning:
- Most respondents (60.8%) never use air conditioning in living spaces.

8. Electric radiator:
- An overwhelming majority (73.1%) never use an electric radiator.

9. Dishwasher:

- Similar to the electric radiator, a large majority of respondents (73.3%) never use the dishwasher.

10. Vacuum cleaner:

- The use of this cleaning appliance is more common, with 41.3% of respondents stating that they use it 1–2 times a week.

11. Hair straightener/curling board:

- The majority (58.4%) never use this device, indicating limited use or specific personal care preferences.

12. Electric kettle:

- More than half of respondents (51.5%) never use this device, which may reflect different consumption habits or preferences for other methods of heating water.

13. Toaster:

- Almost half of respondents (48.1%) never use the toaster, showing that it is not considered essential by students in the sample.

3. Electricity saving behaviors in the UPT student dormitories

The section contains information on:

- Turning off the light when leaving the room
- Electric energy consumption habits while watching TV
- Preference for low-energy bulbs
- Preference for laundry drying
- Disconnecting electrical appliances when not in use
- Keeping the TV turned on
- Use of natural light in rooms
- Setting the temperature of the air conditioner relative to the outside one
- Regulation of heater temperature
- Adjusting the temperature in the room
- Attention to the light bulbs' average lifetime hours
- Preference for low-energy household appliances
- Using power saving mode on the mobile phone

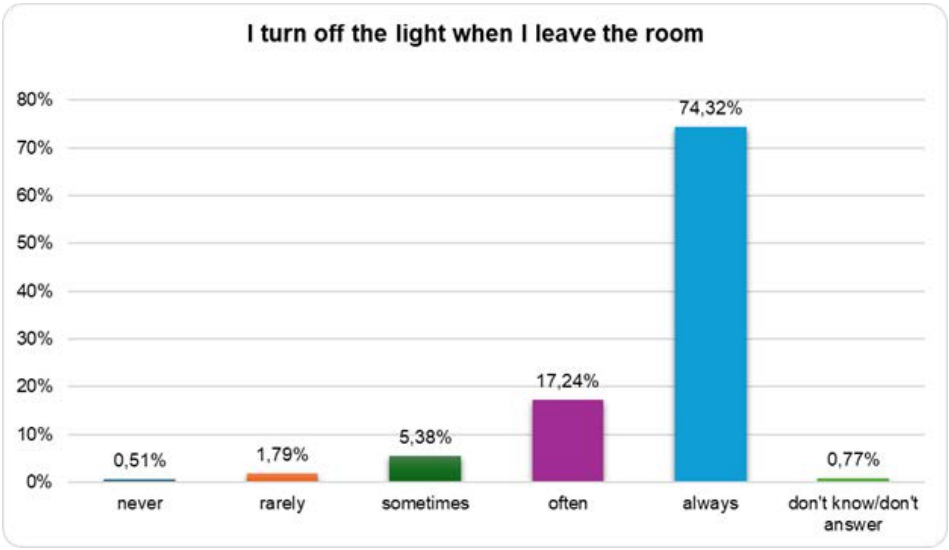


Figure 3.1. Behavior related to turning the light off upon leaving the room

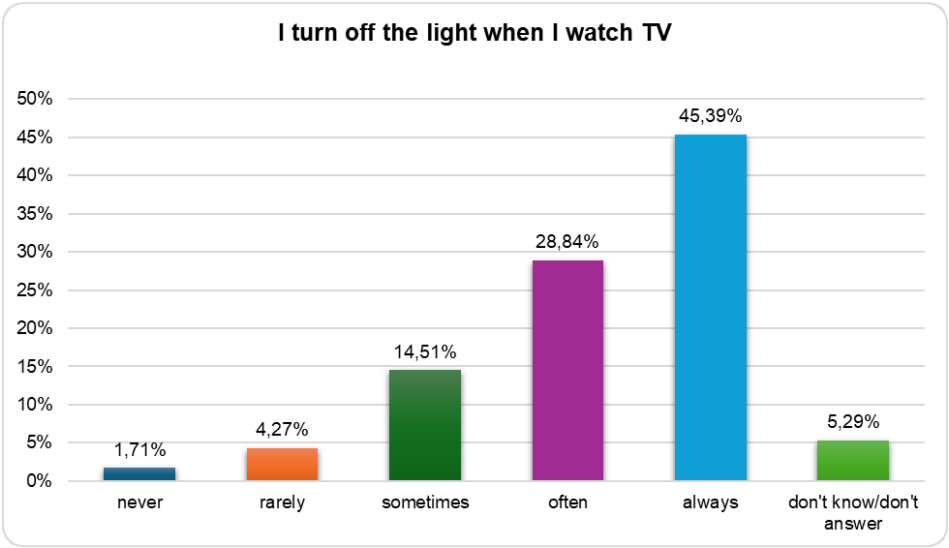


Figure 3.2. Electric energy consumption habits while watching TV

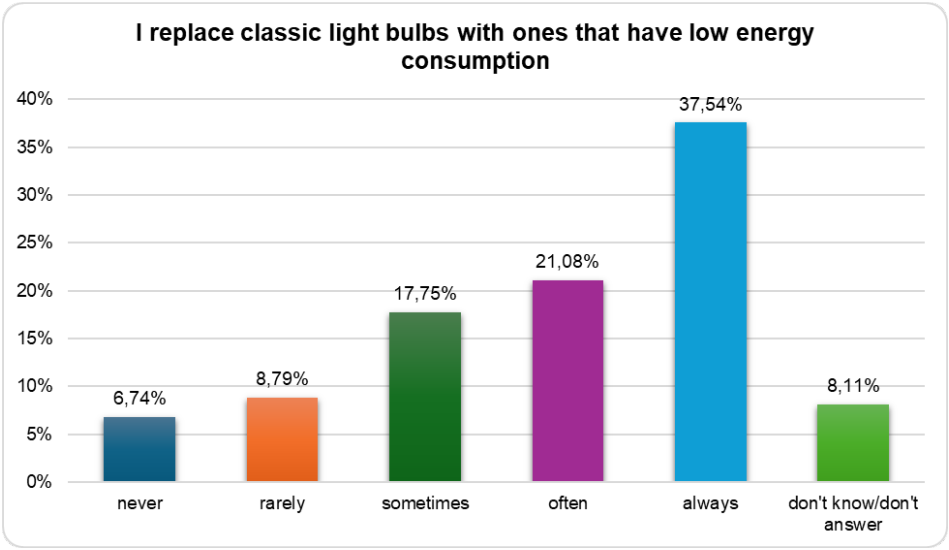


Figure 3.3. Preference for low-energy bulbs

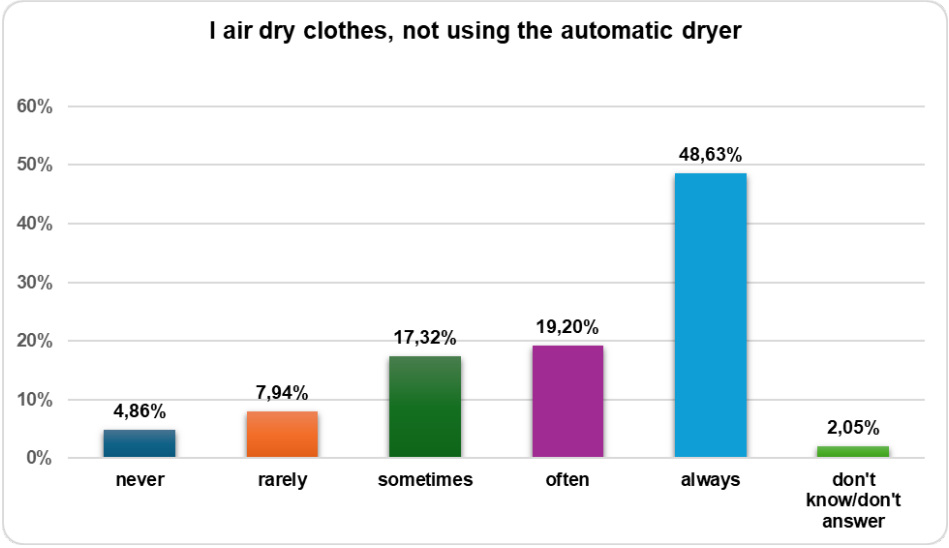


Figure 3.4. Preference for laundry drying

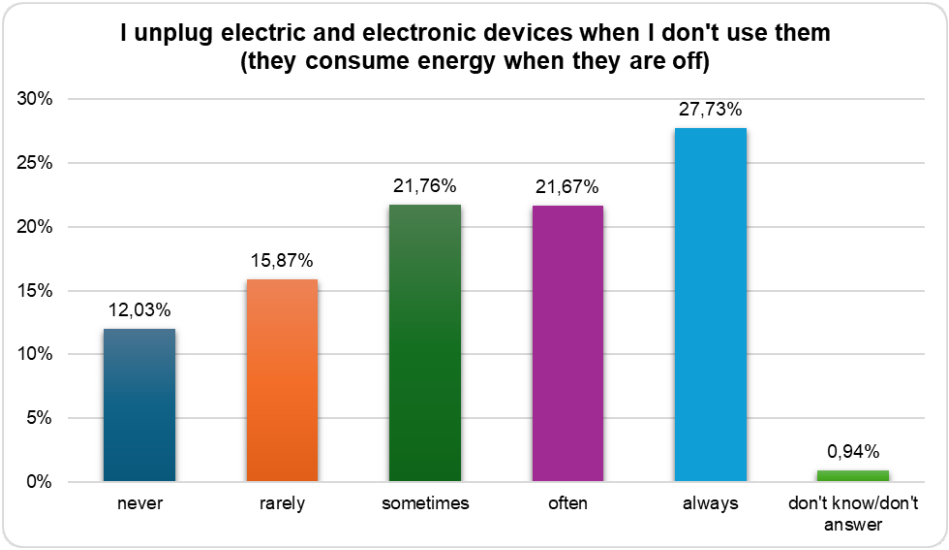


Figure 3.5. Disconnecting electrical appliances when not in use

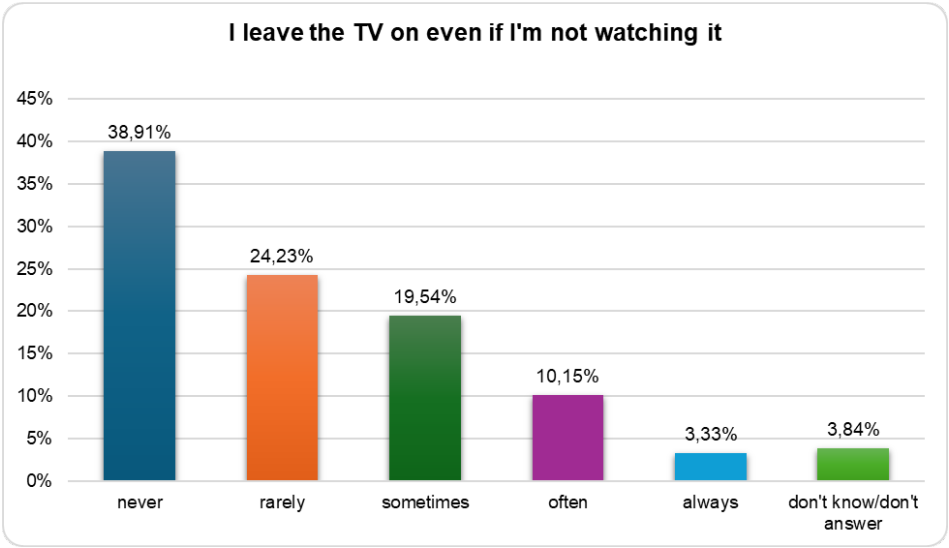


Figure 3.6. Keeping the TV turned on

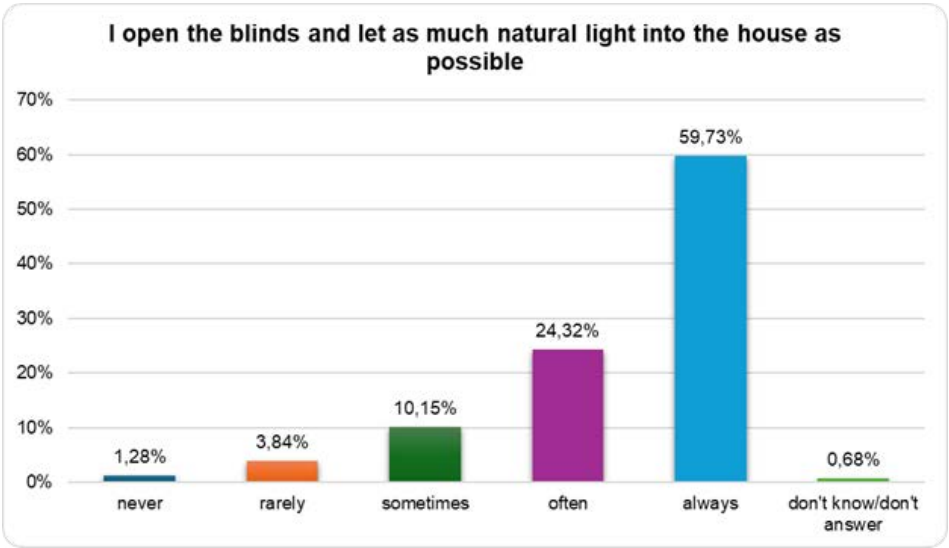


Figure 3.7. Use of natural light in rooms

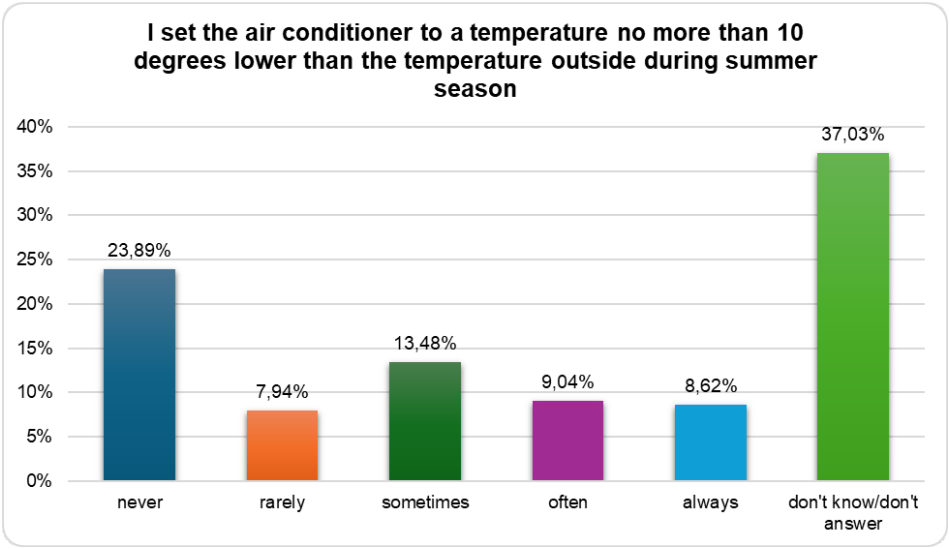


Figure 3.8. Setting the temperature of the air conditioner relative to the outside one

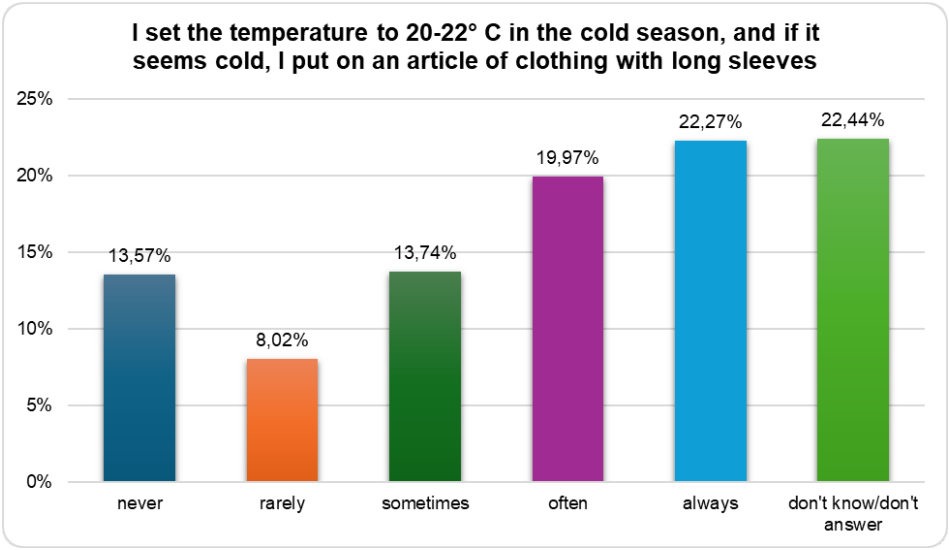


Figure 3.9. Setting the temperature in the room and using warner clothing, if necessary

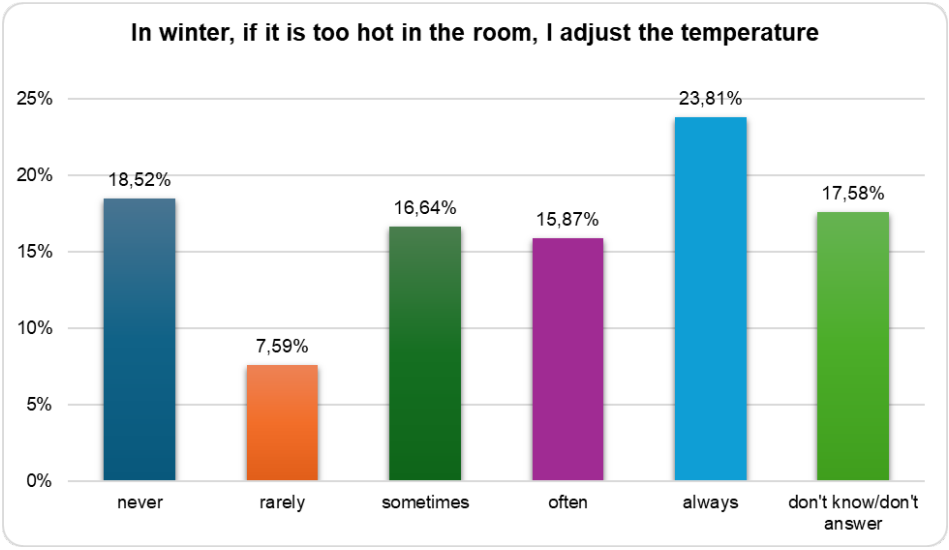


Figure 3.10. Adjusting the temperature in the room

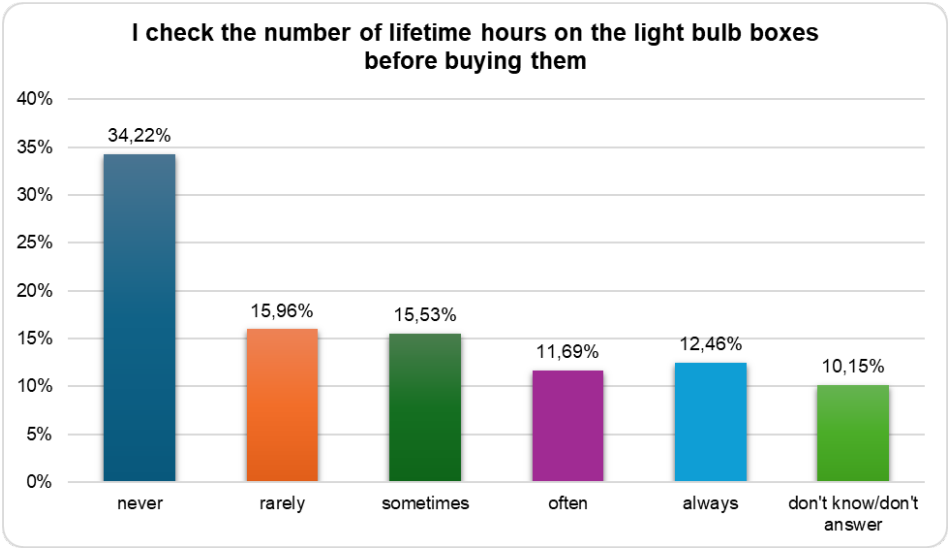


Figure 3.11. Attention to the light bulbs' average lifetime hours

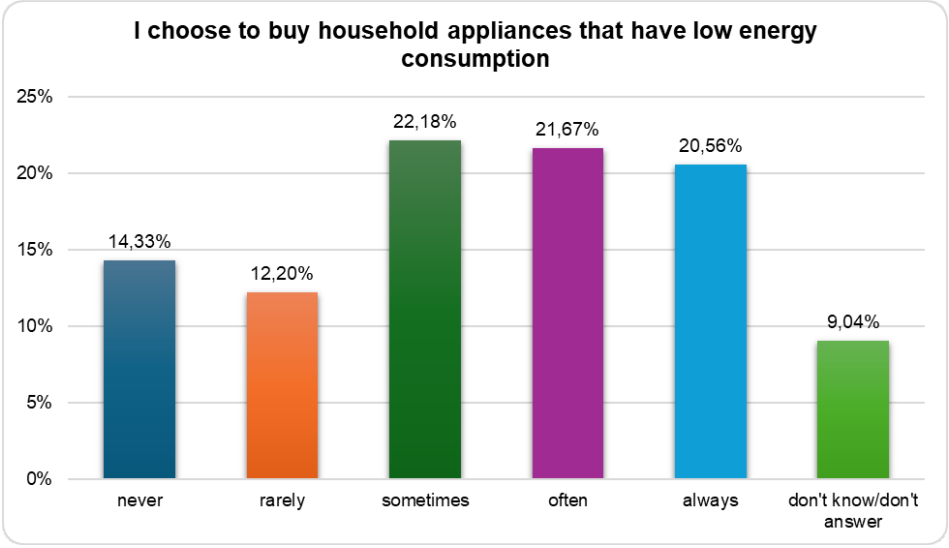


Figure 3.12. Preference for low-energy household appliances

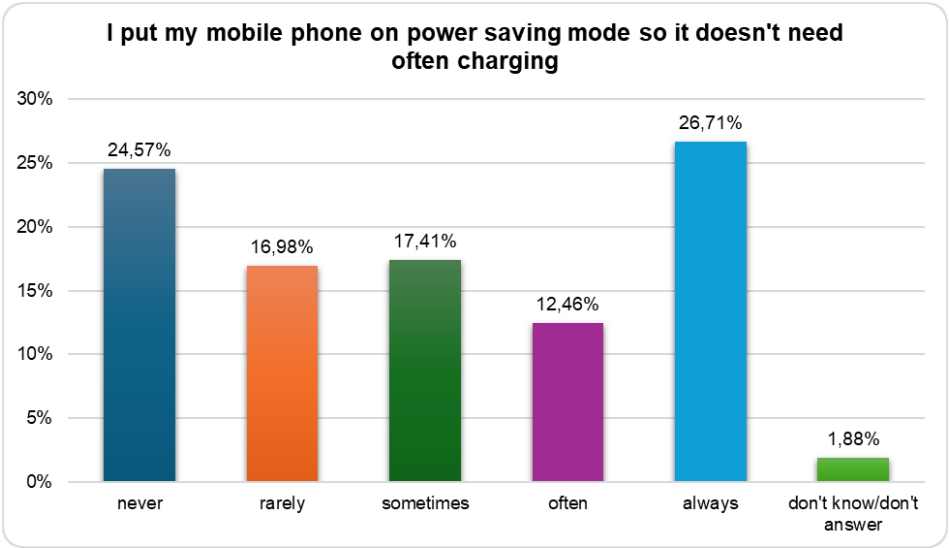


Figure 3.13. Using power saving mode on the mobile phone

Results in brief

1. Turning off the light when leaving the room:

- The majority of respondents (74.3%) say they always turn off the lights when leaving a room, indicating a high level of awareness and action to save electric energy.

2. Turning off the lights when watching TV:

- About half (45.4%) of study participants always turn off the lights while watching TV, suggesting a common practice of reducing electric energy consumption.

3. Replacing classic bulbs with energy-efficient ones:

- A significant proportion of subjects (37.5%) adopted low-energy bulbs as standard, reflecting a positive trend towards more sustainable lighting solutions.

4. Air drying laundry instead of using an automatic dryer:

- Almost half (48.6%) of participants prefer to air dry the laundry, demonstrating a preference for environmentally friendly drying methods.

5. Unplugging unused electrical and electronic appliances:

- More than a quarter of the respondents (27.7%) always do this, indicating an awareness of the "phantom" electric energy consumption. However, there are two categories of respondents who require special attention: those who "never" (12%) and those who "rarely" (15.9%) adopt this energy-saving behavior.

6. Keeping the TV on, even if no one watches it:

- A large proportion of the respondents (38.9%) never let their TV run unless they are watching it, indicating an energy-saving behavior. A minority of the students choose to maintain this behavior more frequently: 10.2% of the respondents indicate that they do this often, while 3.3% say they always leave the TV on, even when they are not present in the room.

7. Maximizing the use of natural light:

- An impressive majority (59.7%) of study participants always open blinds to let natural light into the room, highlighting a clear preference for natural over artificial lighting.

8. Air conditioning temperature setting:

- A notable proportion of respondents choose not to follow the recommendation to maintain the temperature difference from the outside at no more than 10 degrees. 23.9% of participants indicate that they never set the air conditioning according to this practice, while 7.9% of them rarely do so.

9. Regulation of heater temperature:

- 22.3% of those surveyed always set the heater temperature to an energy-efficient level, indicating good practices, but leaving room for improvement. At the opposite pole there is a cumulative proportion of 21.6% of respondents who indicate that they never or rarely follow this recommended practice for energy efficiency and sustainability.

10. Regulation of radiator temperature:

- About a quarter (23.8%) of the surveyed students always regulate the temperature through the radiator faucet if it is too hot, showing a conscious approach to heat management. The results show that a quarter of participants (26.1%) choose not to adjust or adjust the temperature only rarely through the radiator faucet when they consider it too hot in the room (by cumulating the answer options never (18.5%) and rarely (7.6%).

11. Checking the lifetime hours of the electric bulbs:

- A significant proportion of respondents do not pay special attention to this aspect. 34.2% of participants indicate that they never check this information, while 16.0% of them rarely do so. These data suggests that half of respondents (50.2%) do not place much emphasis on the durability of bulbs at the time of purchase, which may reflect a lack of awareness of the long-term impact of choosing more energy-efficient bulbs.

12. Choice of appliances with low energy consumption:

- There is a relatively equal distribution between different behaviors, with 20.6% of people surveyed always energy-efficient appliances. A combined proportion of 26.5% of participants (14.3% never and 12.2% rarely) do not prioritize energy efficiency when making such purchases.

13. Using power saving mode on mobile devices:

- About a quarter (26.7%) of the students in the sample always use energy saving mode on their mobile phones, indicating a growing awareness of the importance of saving energy even in using small devices. However, 41.6% of respondents (24.6% never and 17.0% rarely) do not activate this function to reduce the frequency of charging operations.

Associated research

Modern life depends on the availability of electric energy but, as UN reports show, prioritizing energy efficiency in policy and increasing investment are needed to achieve energy and climate targets. Otherwise "the 2030 Agenda will become an epitaph for a world that might have been" as António Guterres, UN Secretary-General remarked. Recent research shows that residential sector energy consumption has grown yearly by 1% since 2000, representing almost a quarter of global energy consumption and represents a major contribution to climate change and global warming. The research team represented by Mariana Cernicova-Buca, Vasile Gherheș, Gabriel-Mugurel Dragomir, and Roxana-Mihaela Sirbu analyzed in the article "Electrically Savvy or Not? Tentative Portrait of the Romanian Student as a Consumer of Electric Devices and Utilities" *Sustainability* 16, no. 3: 1239. https://doi.org/10.3390/su16031239 the profile of the Romanian student as a consumer of electricity and the influence of the place of residence (on-campus/off campus) and gender on the consumption patterns. These data highlight the actionable characteristics that can influence the young person's choices towards an attitude of care for the resources that ensure a modern, comfortable, but energy-efficient lifestyle.

4. Water saving behaviors in the UPT student dormitories

The section contains information on:

- Water use behavior when cleaning dishes and food
- Water consumption behavior during tooth brushing
- Timeliness of repair of dripping taps
- Average shower duration in daily routine
- Preference for low temperature washing machine programs
- Loading efficiently the washing machine
- Water consumption of the shower while applying soap
- Turning on the water a few minutes before showering
- Reporting plumbing malfunctioning

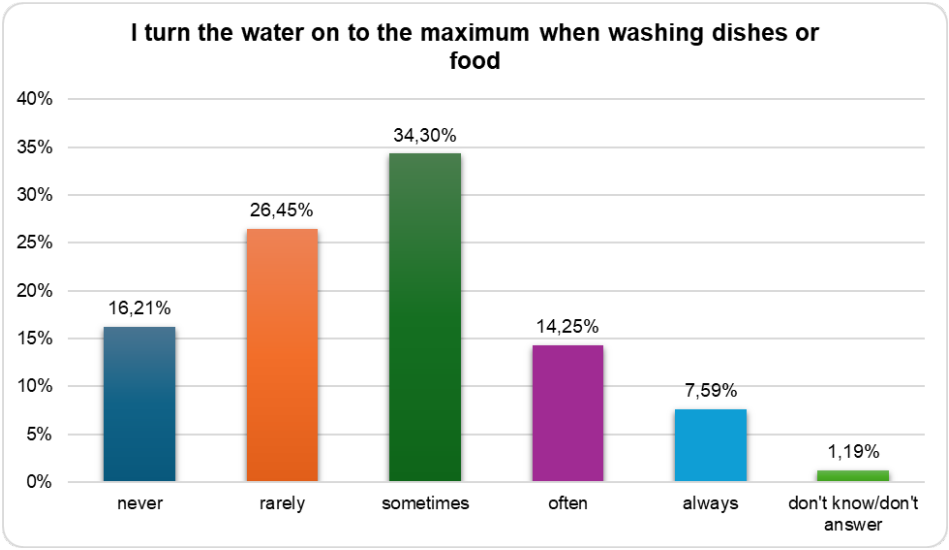


Figure 4.1. Water use behavior when cleaning dishes and food

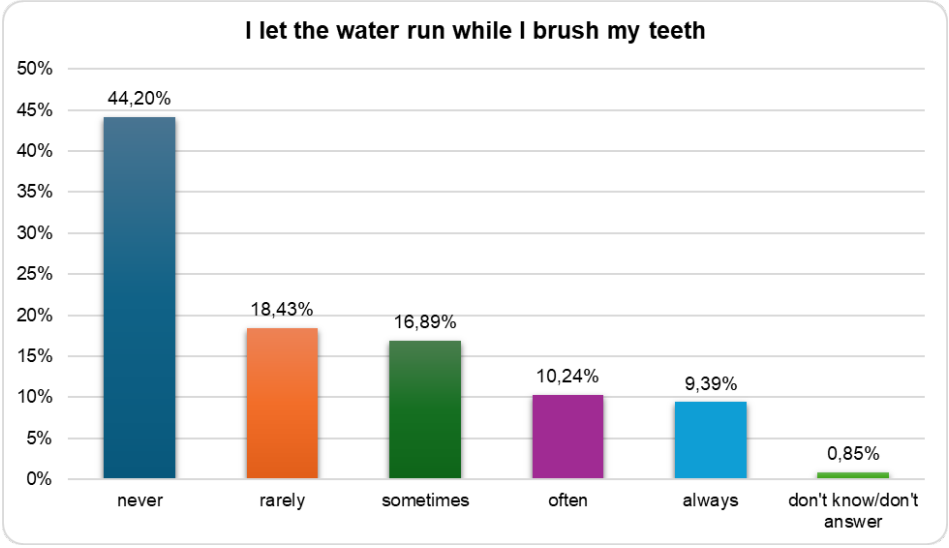


Figure 4.2. Water consumption behavior during tooth brushing

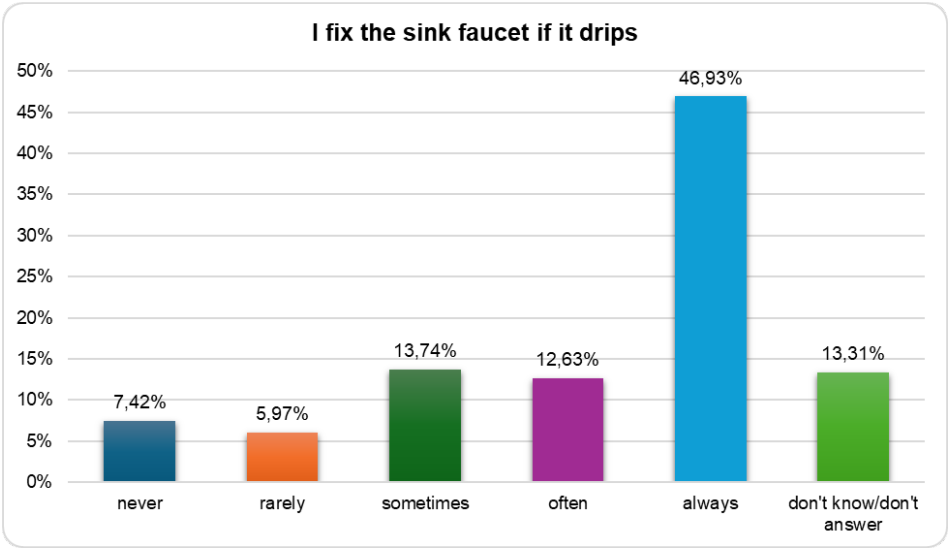


Figure 4.3. Timeliness of repair of dripping taps

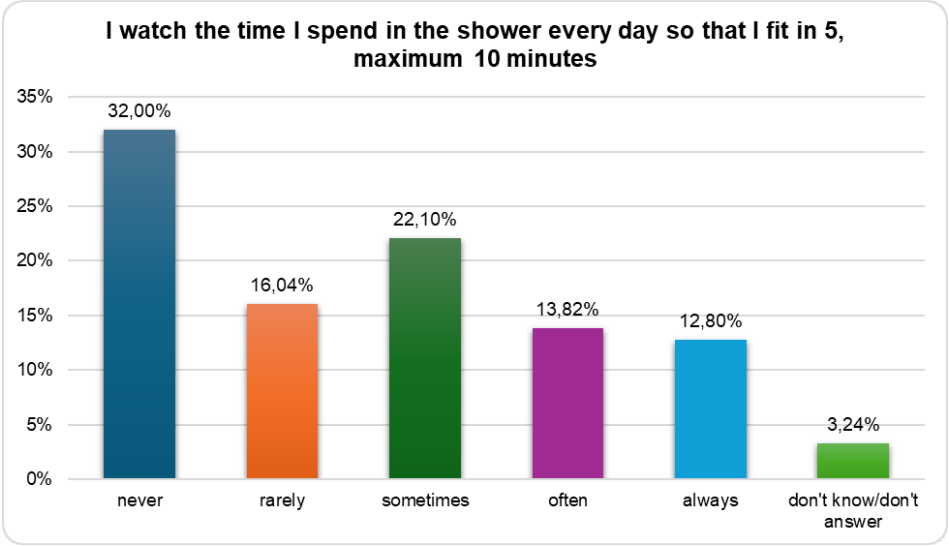


Figure 4.4. Average shower duration in daily routine

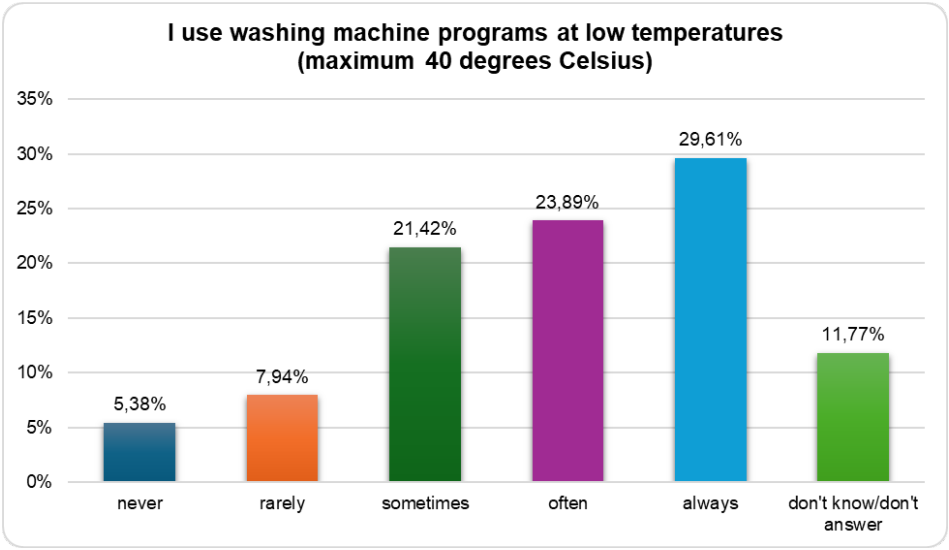


Figure 4.5. Preference for low temperature washing machine programs

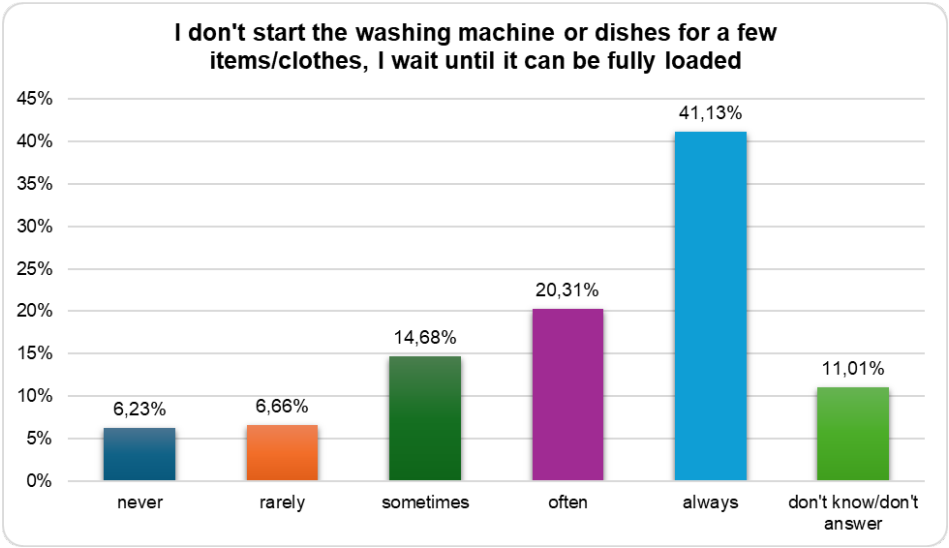


Figure 4.6. Loading efficiently the washing machine

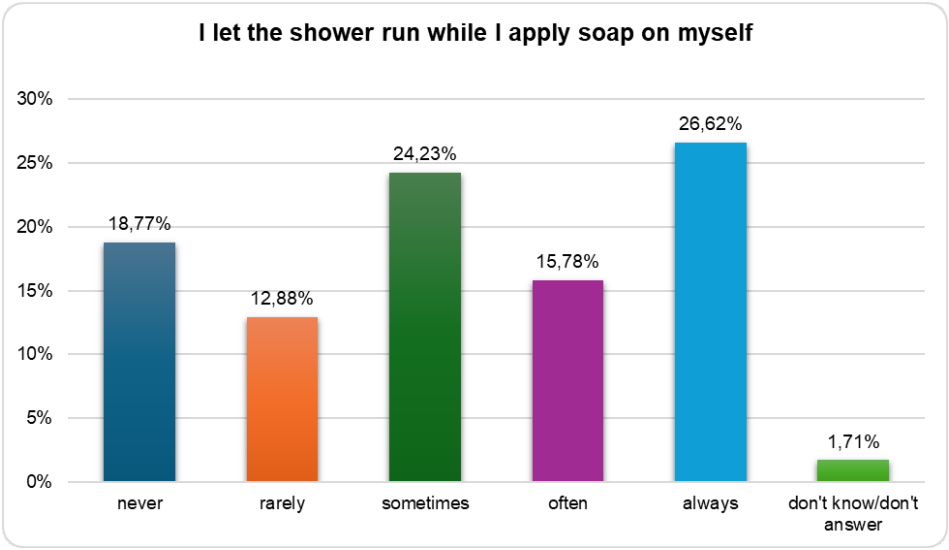


Figure 4.7. Water consumption of the shower while applying soap

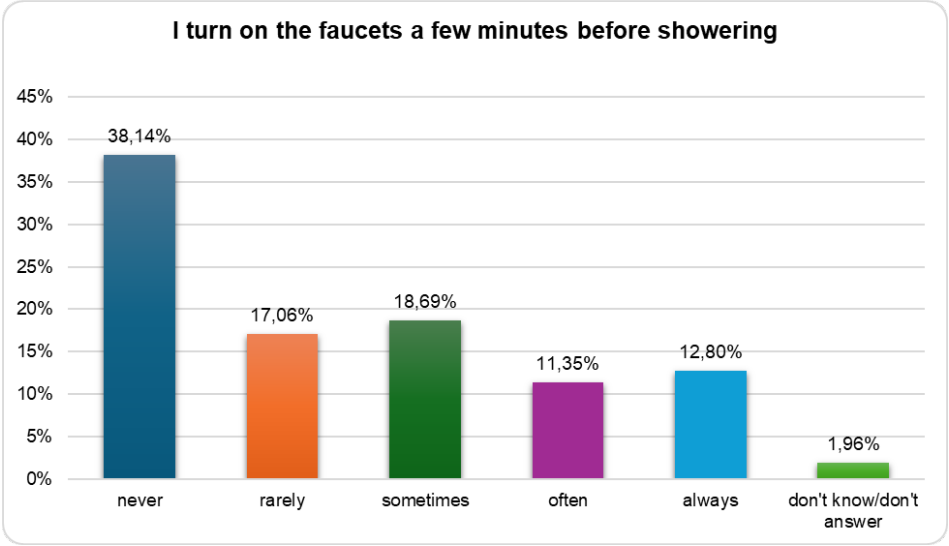


Figure 4.8. Turning on the water a few minutes before showering

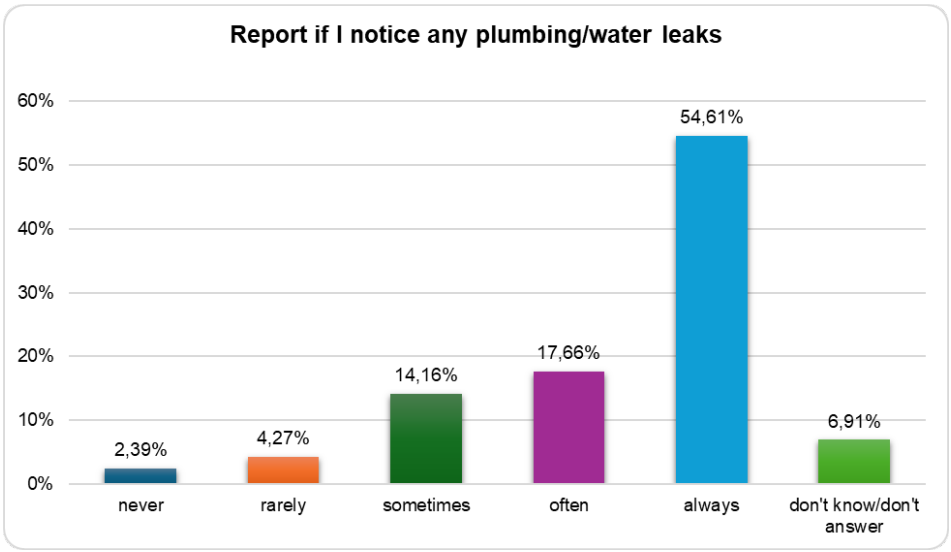


Figure 4.9 Reporting plumbing malfunctioning/water leaks

Results in brief

1. Water use behavior when cleaning dishes and food

- A significant proportion of the respondents (21.8%) confess they open the water tap to the maximum frequently (always or often), indicating a less sustainable practice in terms of conserving water resources. On the other hand, more than one third of the sample, 34.3%, resort to this practice only occasionally, suggesting that there is probably partial awareness of the importance of saving water.

2. Water consumption behavior during tooth brushing

- A significant percentage of the students in the sample (44.2%) never let water run while brushing their teeth, reflecting positive water-saving behavior. The fact that almost one-fifth of the sample allows water to flow freely during tooth brushing (10.2% often and 9.4% always) indicates an opportunity for improvement in terms of water conservation and adoption of more sustainable habits in daily activities.

3. Timeliness of repair of dripping taps

- Almost half of the respondents (46.9%) declare they always repair dripping taps, demonstrating a responsible attitude towards preventing water waste.

4. Average shower duration in daily routine

- More than a third of the students (32%) do not time the shower duration. Over a quarter of the sample (26.6% of the respondents, cumulating the answers choosing the options frequently and always) consciously manage the time spent in the shower.

5. Preference for low temperature washing machine programs

- Almost a third (29.6%) of the participants in the study always use washing programs at low temperatures, helping to save electric energy and water.

6. Loading efficiently the washing machine

- A high proportion (41.1%) of the respondents wait to be able to fully charge the washing machine before turning it on, indicating a water-efficient consumption practice.

7. Water consumption of the shower while applying soap

- A significant percentage of the sample, 42.4% (15.8% often and 26.6% always) practice this behavior frequently or constantly. This trend points to an area where there is great potential for improvement in terms of water conservation.

8. Turning on the water tap a few minutes before showering

- Almost a quarter of the respondents (24.1%) turn the shower on minutes before actually taking the shower, which may indicate either a preference for comfort (e.g., waiting for water to reach a certain temperature) or a lack of awareness of how much water is wasted by this behavior. A large proportion (38.1%) of the respondents never turn on the water tap minutes before showering, thus avoiding unnecessary waste of water.

9. Reporting plumbing malfunctions

- The majority of study participants (54.6%) always announce if they notice malfunctions in the plumbing, helping to prevent leakage and contributing to resources conservation.

5. Sustainable behaviors and practices regarding waste management in the UPT student dormitories

The section contains information on:

- Separate collection of household waste
- Use of reusable bags for shopping
- Reuse of packaging and gift boxes
- Preference for products from local producers
- Choosing eco-friendly cleaning products
- Adoption of eco-friendly means of transport
- Use of rechargeable batteries
- Borrowing books from the library
- Refusal of plastic cutlery and straws
- Using textile towels instead of paper towels
- Ecological responsibility during outdoor activities
- Preference for tap water, not bottled in plastic containers
- Use of reusable cups or glass
- Opting for online payments and reducing paper consumption
- Donation of unused clothes
- Donation of functional electronic devices
- Attention to durability when purchasing goods
- Repair of broken objects
- Choosing products with eco-friendly packaging when shopping

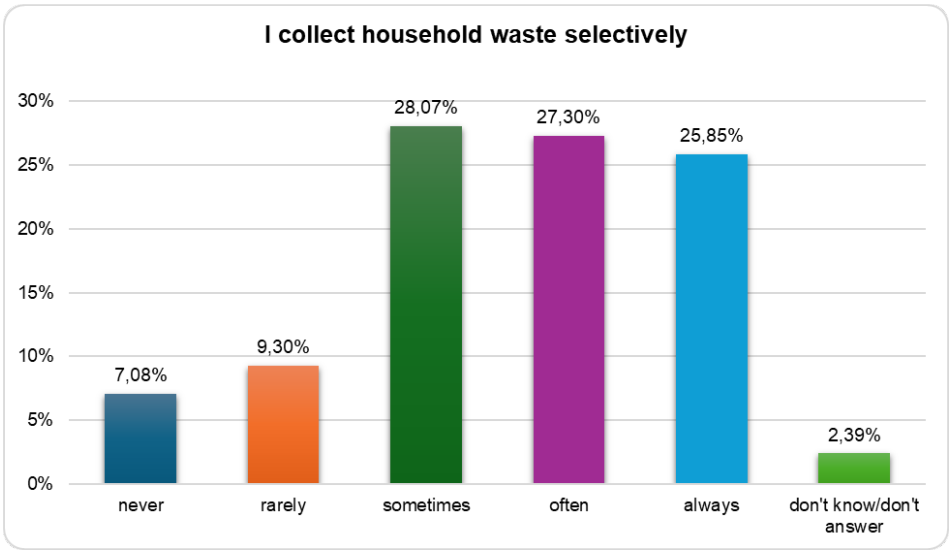


Figure 5.1. Separate collection of household waste

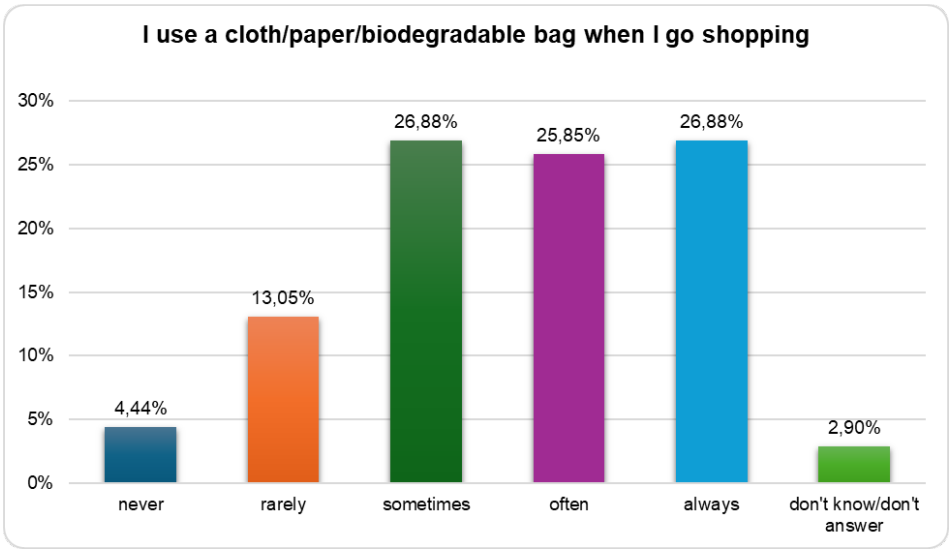


Figure 5.2. Use of reusable bags for shopping

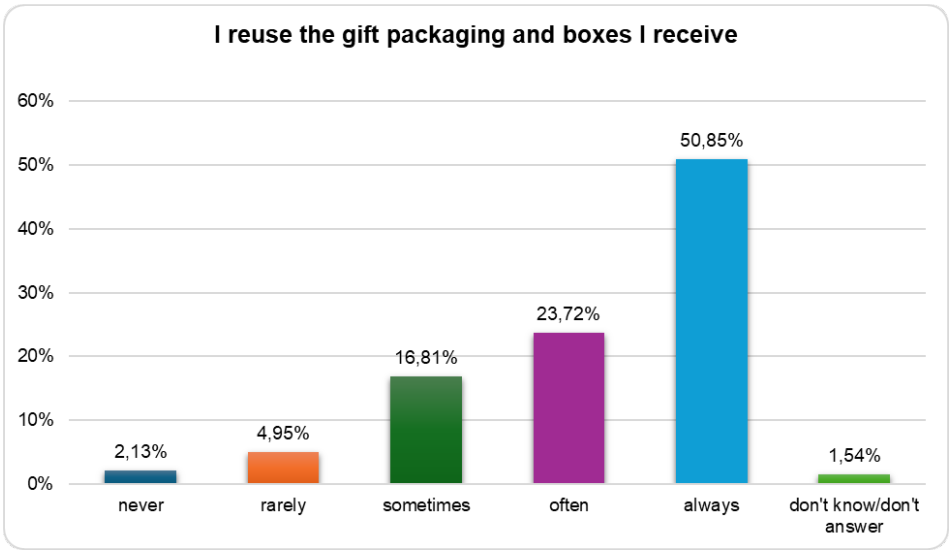


Figure 5.3. Reuse of packaging and gift boxes

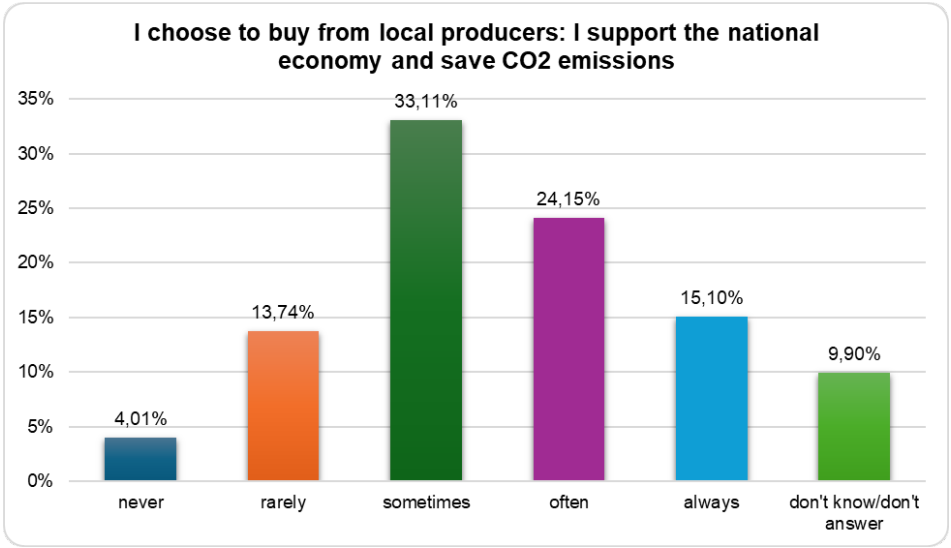


Figure 5.4. Preference for products from local producers

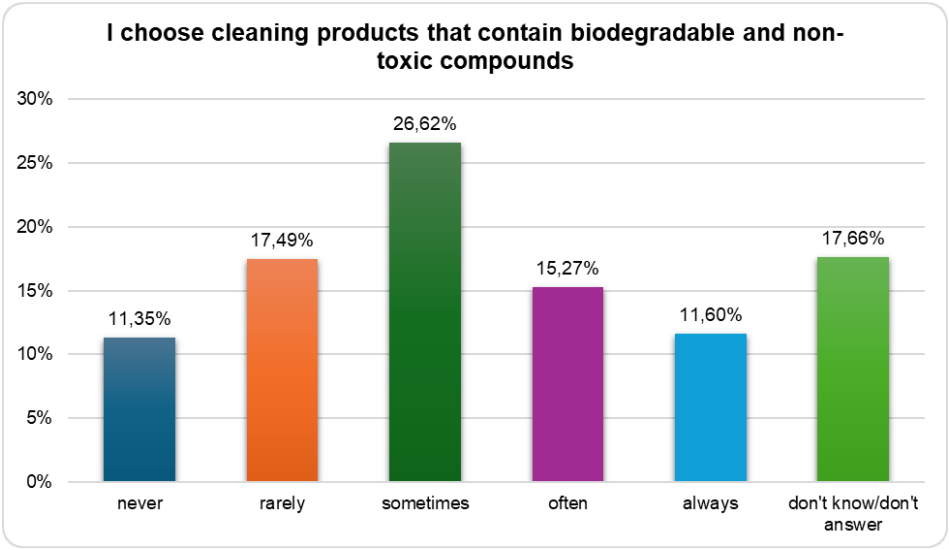


Figure 5.5. Choosing eco-friendly cleaning products

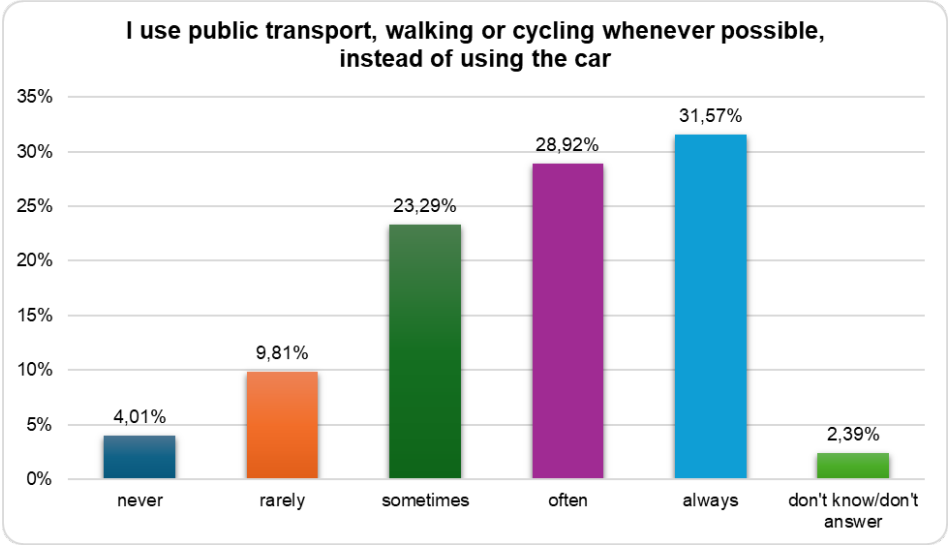


Figure 5.6. Adoption of eco-friendly means of transport

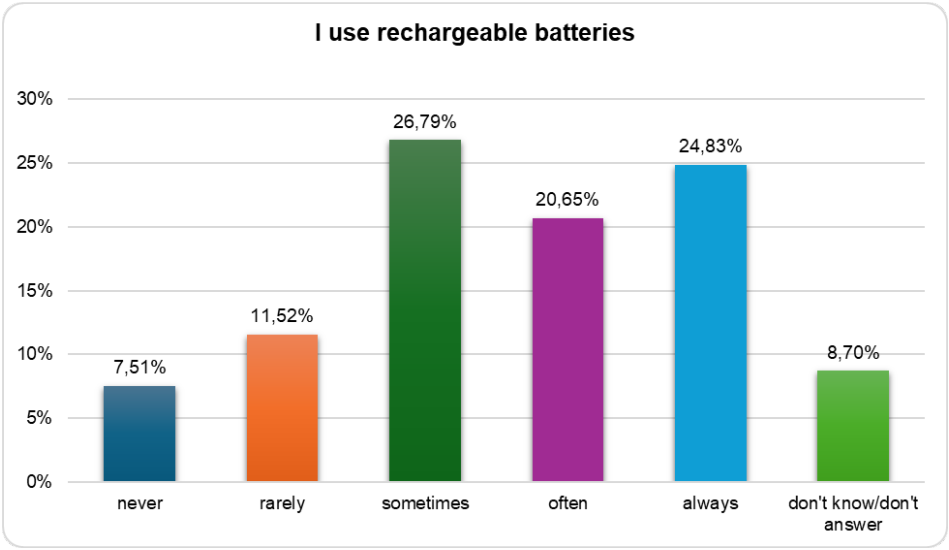


Figure 5.7. Use of rechargeable batteries

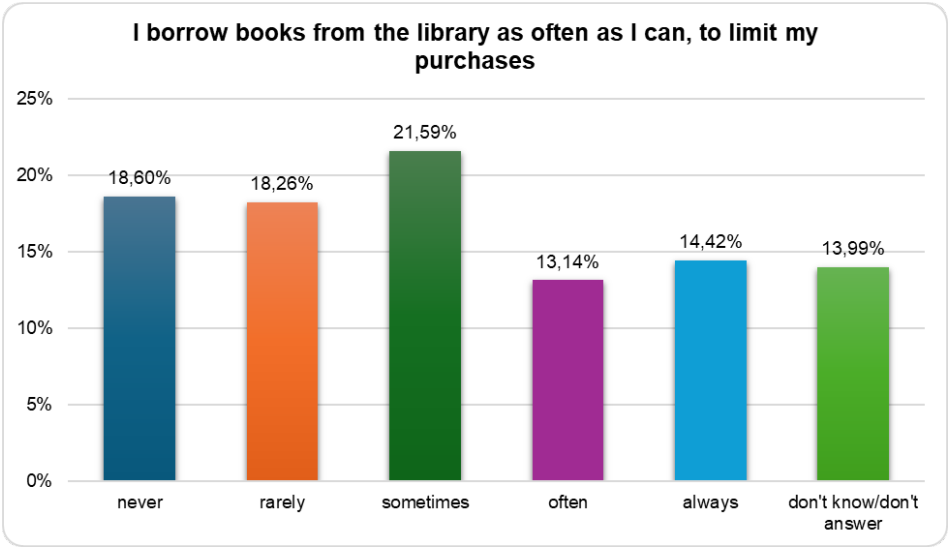


Figure 5.8. Borrowing books from the library

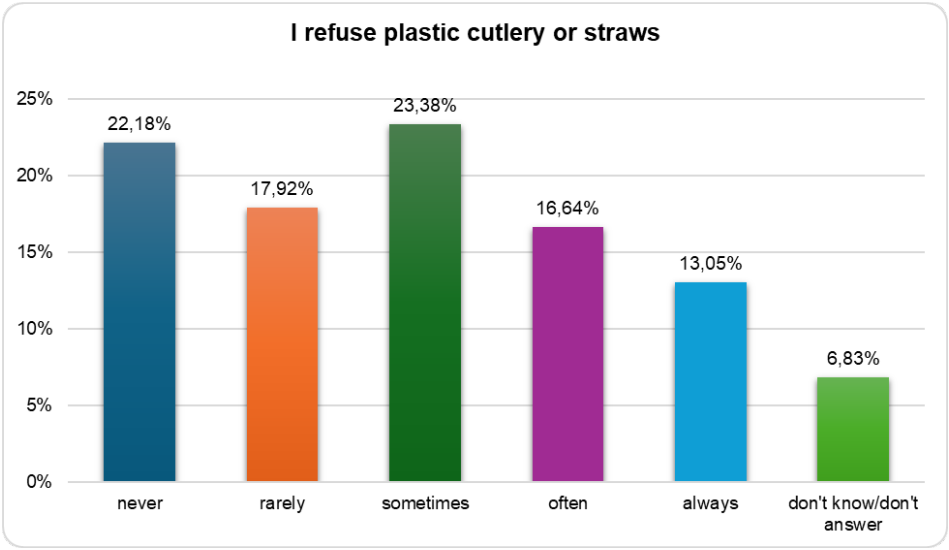


Figure 5.9. Refusal of plastic cutlery and straws

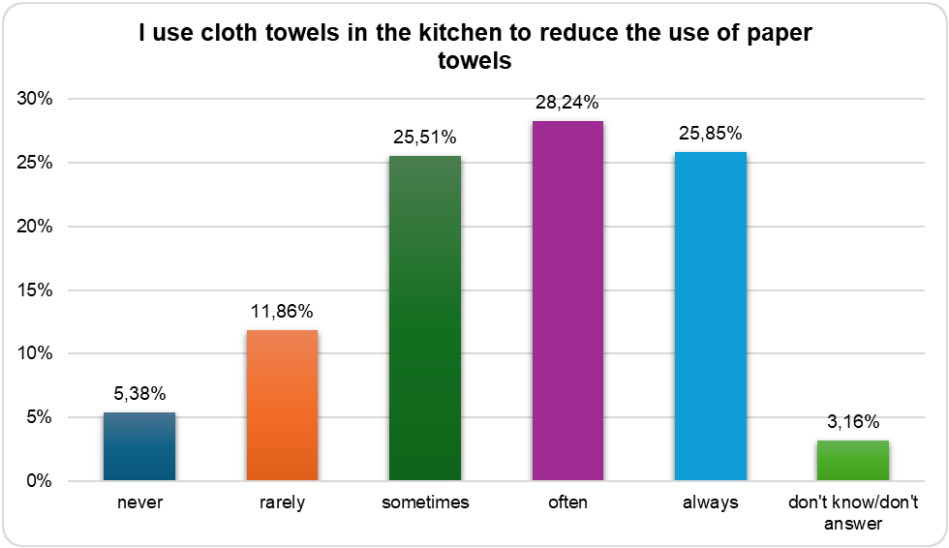


Figure 5.10. Using textile towels instead of paper towels

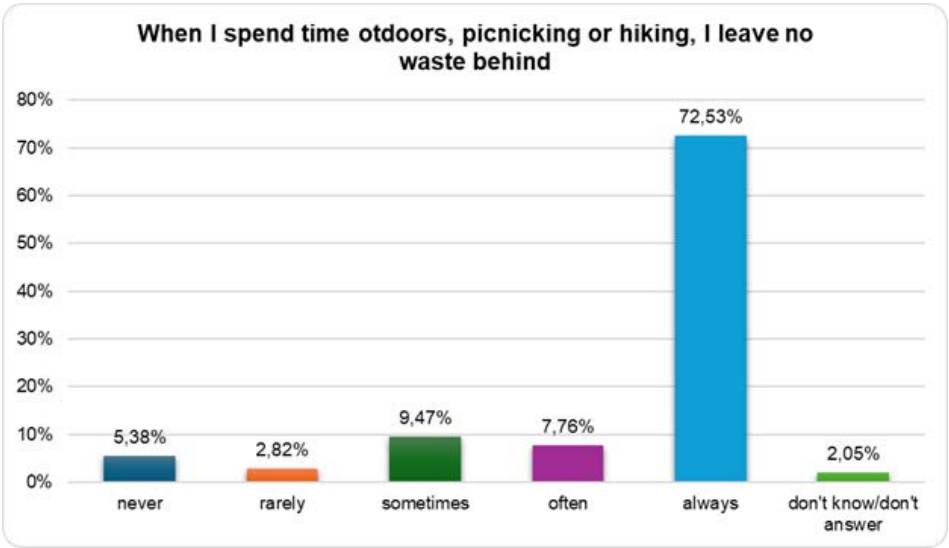


Figure 5.11. Ecological responsibility during outdoor activities

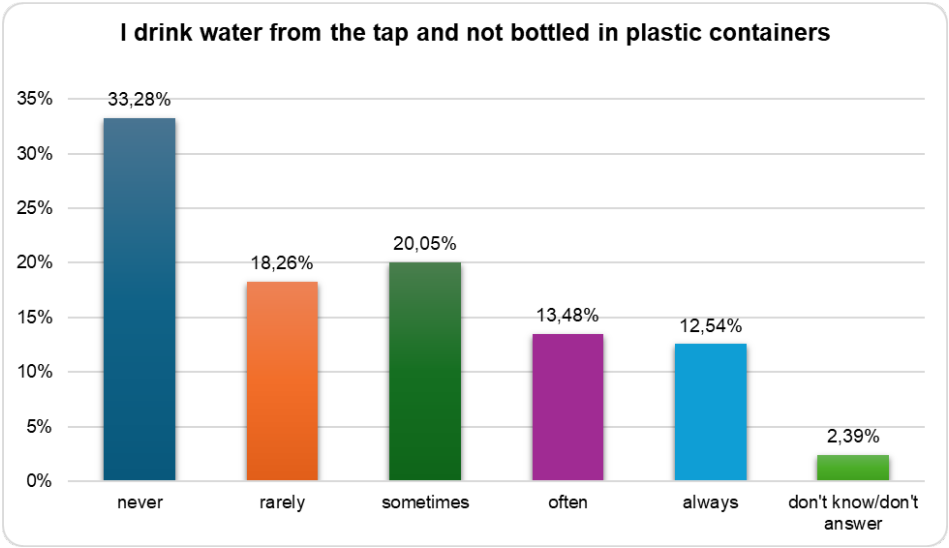


Figure 5.12. Preference for tap water, not bottled in plastic containers

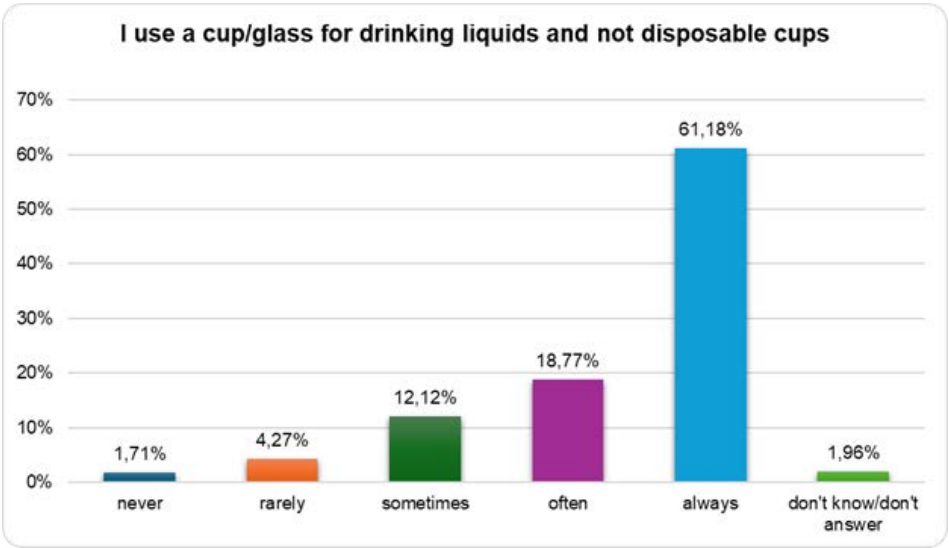


Figure 5.13. Use of reusable cups or glass

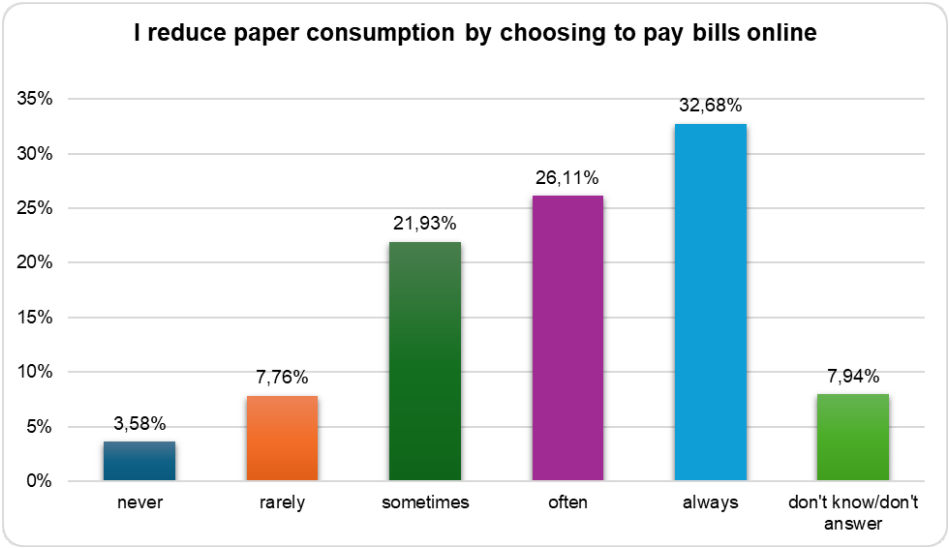


Figure 5.14. Opting for online payments and reducing paper consumption

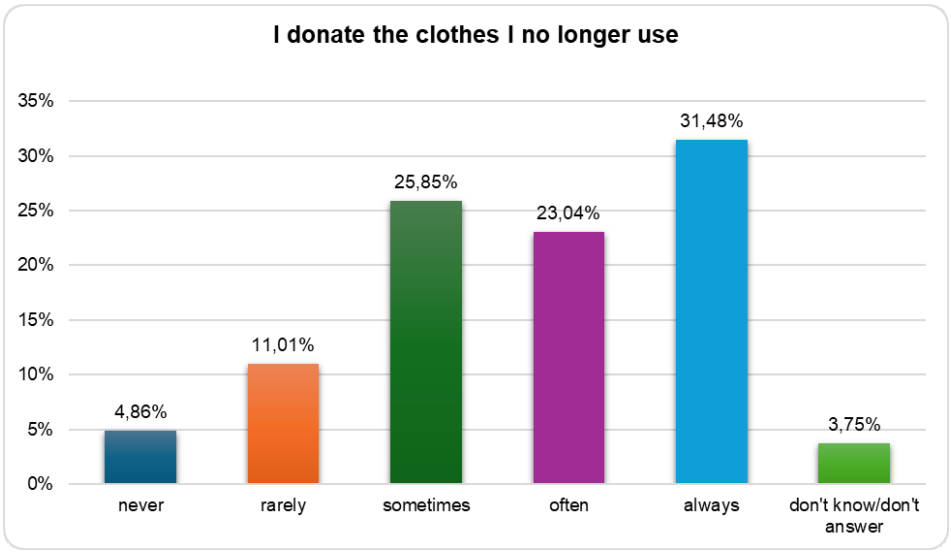


Figure 5.15. Donation of unused clothes

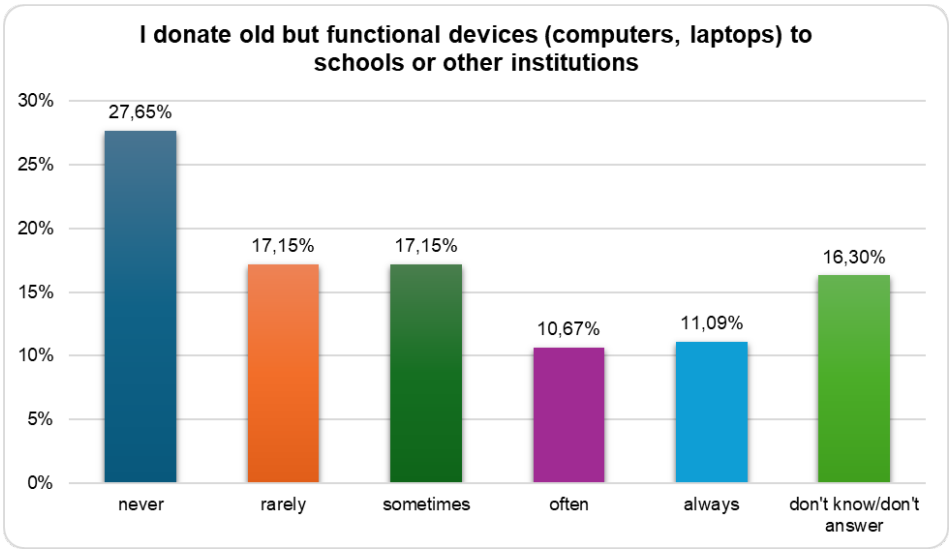


Figure 5.16. Donation of functional electronic devices

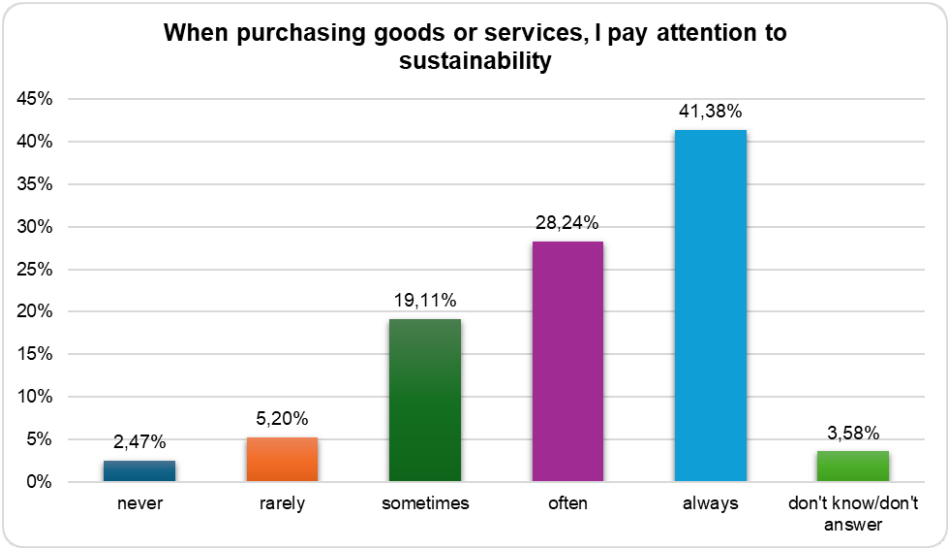


Figure 5.17. Attention to durability when purchasing goods

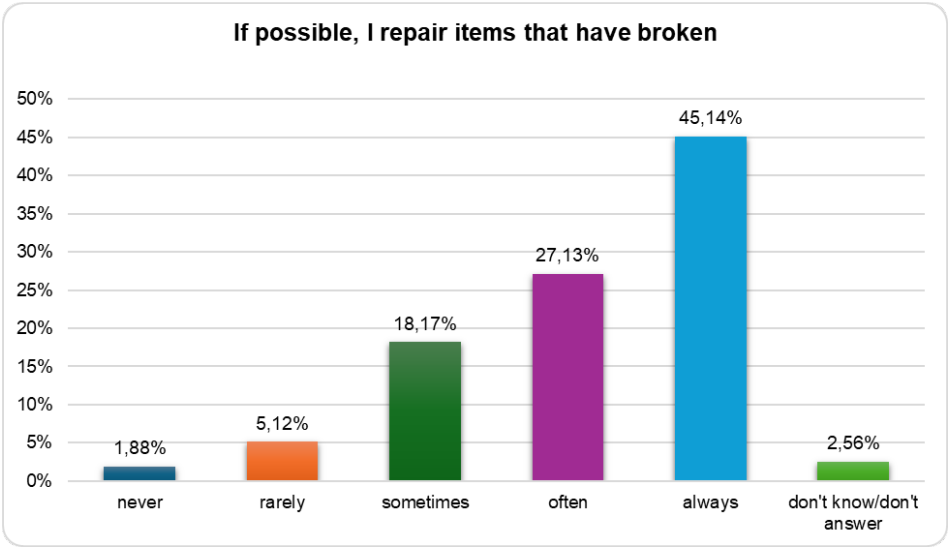


Figure 5.18. Repair of broken objects

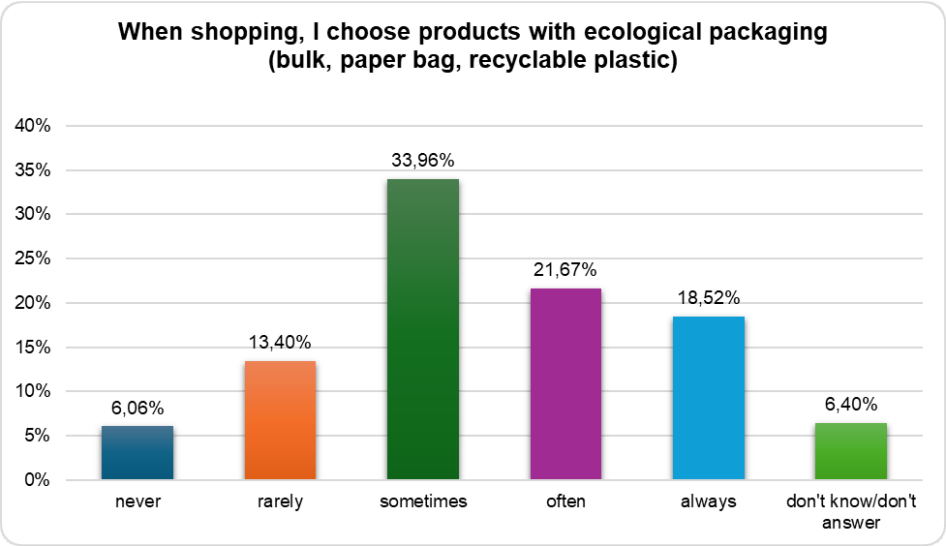


Figure 5.19. Choosing products with eco-friendly packaging when shopping

Results in brief

1. Separate collection of household waste

- Most respondents (53.2%) selectively collect household waste frequently or always, indicating an awareness of the importance of recycling. We note that there is also a proportion of 16.4% of them (7.1% never and 9.3% rarely) who do not practice this behavior or practice separate collection only occasionally.

2. Use of reusable bags when shopping

- About half of the participants in the study (52.8%) often or always use cloth/paper/bio-degradable nets when shopping, demonstrating a commitment to reducing plastic waste. On the other hand, 17.5% of them (4.4% never and 13.1% rarely) avoid or only occasionally use these sustainable alternatives.

3. Reuse of gift packaging and boxes

- A significant majority of the respondents (74.6%) reuse gift bags and boxes, reflecting a common practice of waste reduction.

4. Preference for products from local producers

- Less than half of respondents (39.2%) frequently or always choose to buy from local producers, suggesting an opportunity to improve local support and reduce CO2 emissions. On the other hand, less than 17.7% of the respondents (4.0% never and 13.7% rarely) do not prioritize or only occasionally choose to buy from local producers.

5. Choosing eco-friendly cleaning products

- A quarter of the sample (26.9%) declare to use eco-friendly cleaning products, indicating an area where awareness can be raised, and behavior can be improved often or always. A proportion of 11.3% of respondents indicate that they never choose such products, while 17.5% of them rarely do so.

6. Adoption of eco-friendly means of transport

- The majority of the surveyed students (60.5%) frequently or always use public transport, walking or cycling, showing a positive trend towards sustainable mobility.

7. Use of rechargeable batteries

- Almost half of the respondents (45.4%) often or always use rechargeable batteries, demonstrating a preference for sustainable solutions. A cumulative proportion of 19% of the respondents (out of which 7.5% selected the option never and 11.5% the option rarely) do not or only occasionally use rechargeable batteries.

8. Borrowing books from the library

- A relatively small proportion (27.5%) borrow books from the library frequently or always. 18.6% of respondents indicate that they never borrow books from the library, while 18.3% of them rarely do so. In other words, more than a third (36.9%) of the sample seems to prefer buying new books over borrowing them.

9. Refusal of plastic cutlery or straws

- An important share of the sample (29.7%) often or always refuses plastic cutlery or straws. A proportion of 22.2% of participants indicate that they never refuse plastic cutlery or straws. 17.9% choose to refuse these plastic products rarely, which may indicate a lack of awareness of the problem, but also the existence of barriers to adopting more sustainable behavior consistently.

10. Use of textile towels instead of paper towels

- More than half of the respondents (54.1%) often or always use textile towels, thus reducing paper waste.

11. Environmental responsibility during outdoor activities

- A large majority of subjects (80.3%) do not leave waste behind them when spending time outdoors, showing a deep respect for the environment.

12. Preference for tap water, not bottled in plastic containers

- A significant proportion of 33.3% of respondents indicate that they never drink tap water, preferring bottled water, and 18.3% of them choose to drink tap water rarely. We notice that a proportion of 26% of respondents (13.5% often and 12.5% always) choose to drink tap water frequently or exclusively.

13. Use of reusable cups or glass:

- The majority of the students in the sample (79.2%) often or always use reusable cups or glass, thus avoiding disposable waste.

14. Online payments to reduce paper consumption

- A substantial proportion of respondents (58.8%) choose online payments to reduce paper consumption, demonstrating a commitment to waste reduction.

15. Donation of unused clothes

- The majority of the respondents (54.5%) donate clothes they no longer use, contributing to the circular economy and reducing waste. A small proportion of 4.9% of them indicate that they never donate clothes they no longer use, and 11.0% rarely do so.

16. Donation of functional electronic devices

- Only a minority of those surveyed (21.8%) frequently or always donate old devices, suggesting an area where donation behavior can be improved. 44.8% of respondents (27.6% never and 17.2% rarely) do not practice or practice only occasionally this form of responsible recycling and community support.

17. Attention to sustainability when purchasing goods

- A large proportion of respondents (69.6%) pay attention to the durability of products when making purchases, showing an awareness of the importance of sustainability.

18. Repair of broken objects

- The respondents indicated a strong commitment to sustainable practices, highlighting a clear preference for repairing and extending the life of objects instead of replacing them. This interpretation is prompted by the percentages: 27.1% of the students declare they often repair broken/malfunctioning items, and a majority of 45.1% always do so.

19. Choosing products with ecological packaging

- A significant proportion of the sample (40.2%) frequently or always choose products with ecological packaging, helping to reduce waste. A proportion of 19.5% of respondents (6.1% never and 13.4% rarely) do not prioritize or only occasionally choose environmentally friendly packaging.

6. Recycling behaviors and practices in the UPT student dormitories

The section contains information on:

- Extent of selective collection of household waste
- Selective collection practices in personal space
- Sorting waste according to bin color
- Recycling behavior at school
- Selective collection of waste in various premises
- Glass recycling
- Recycling plastic containers
- Battery recycling
- Light bulb recycling
- Recycling of iron packaging waste
- Aluminum recycling
- Collection and recycling of used food oil
- Recycling of electronics and home appliances
- Recycling printer toner

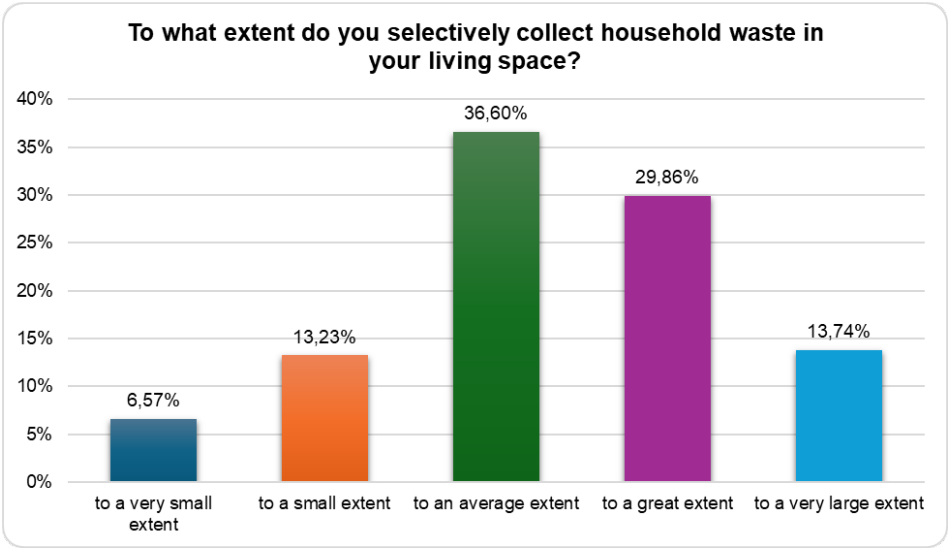


Figure 6.1. Extent of separate collection of household waste

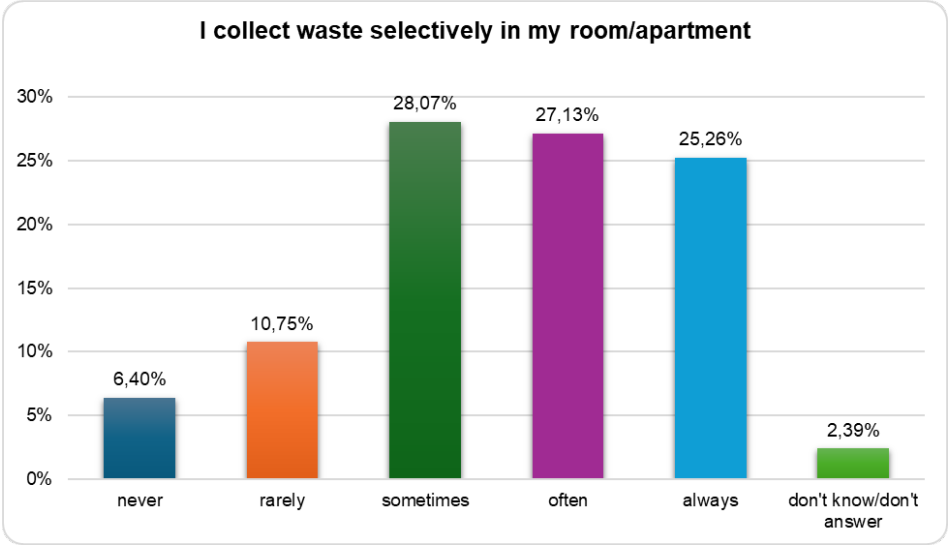


Figure 6.2. Separate waste collection practices in living areas

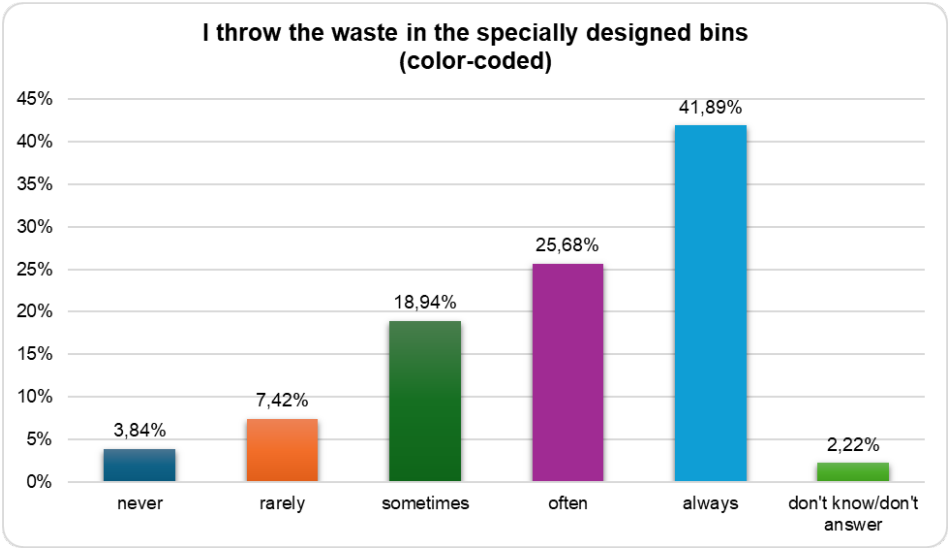


Figure 6.3. Sorting waste according to bin color

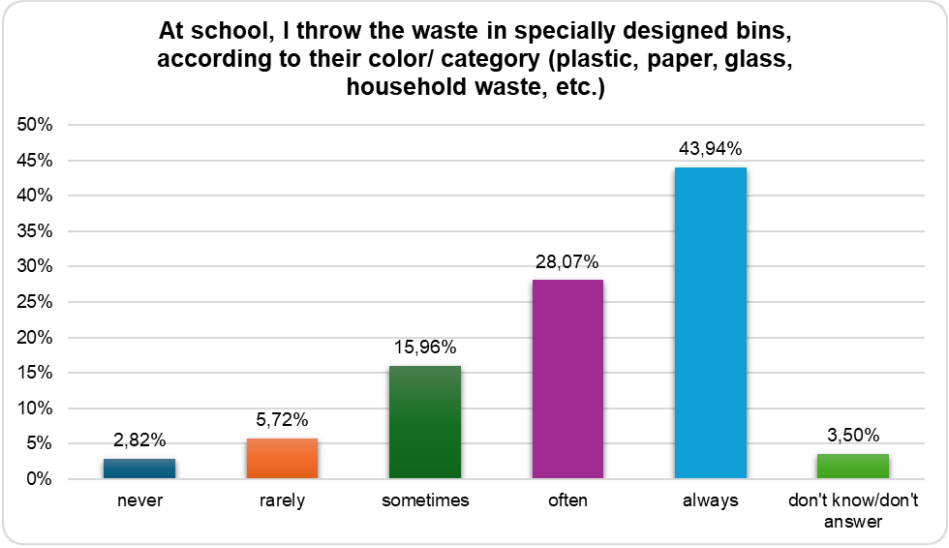


Figure 6.4. Recycling behavior at school

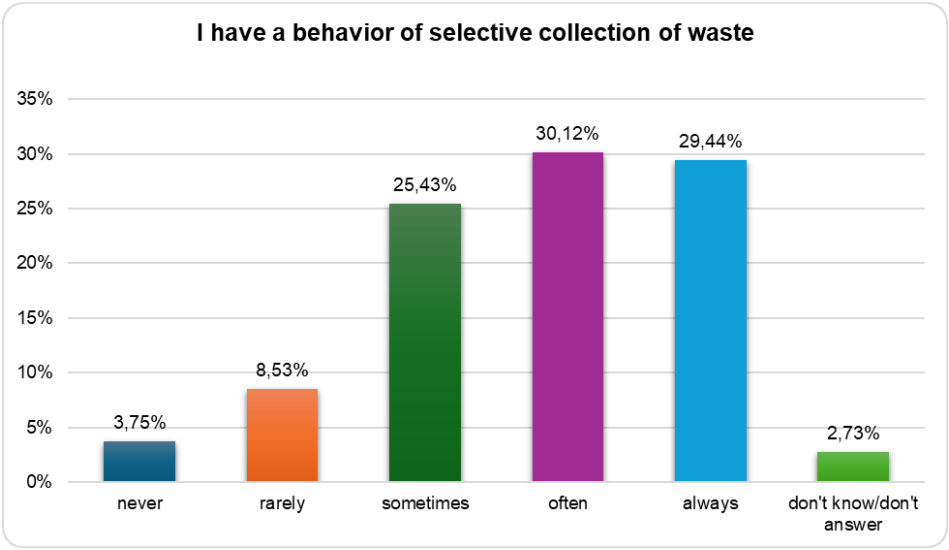


Figure 6.5. Separate collection of waste in various premises

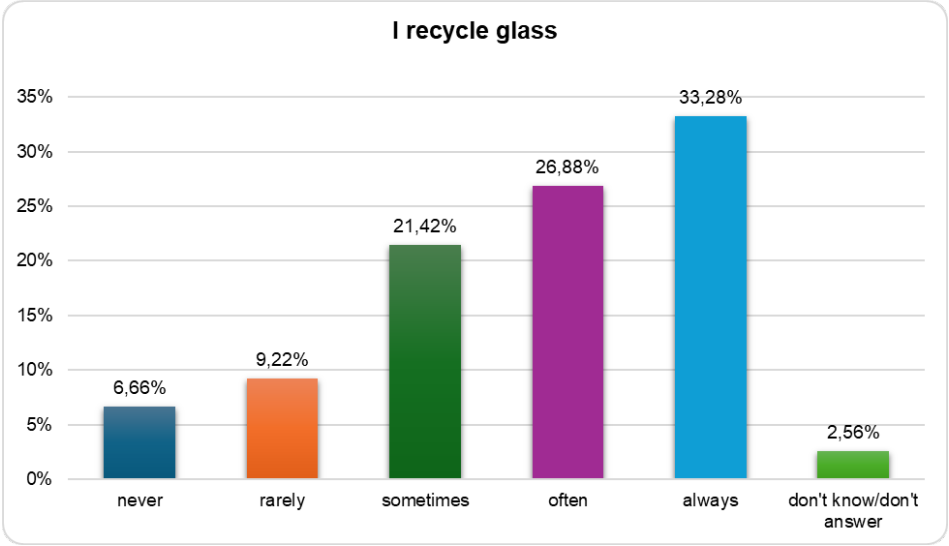


Figure 6.6. Glass recycling

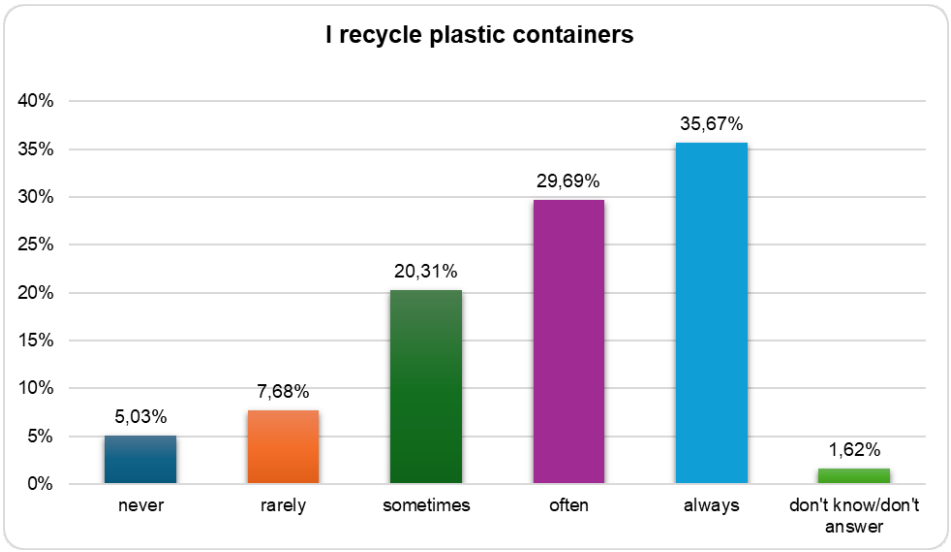


Figure 6.7. Plastic containers recycling

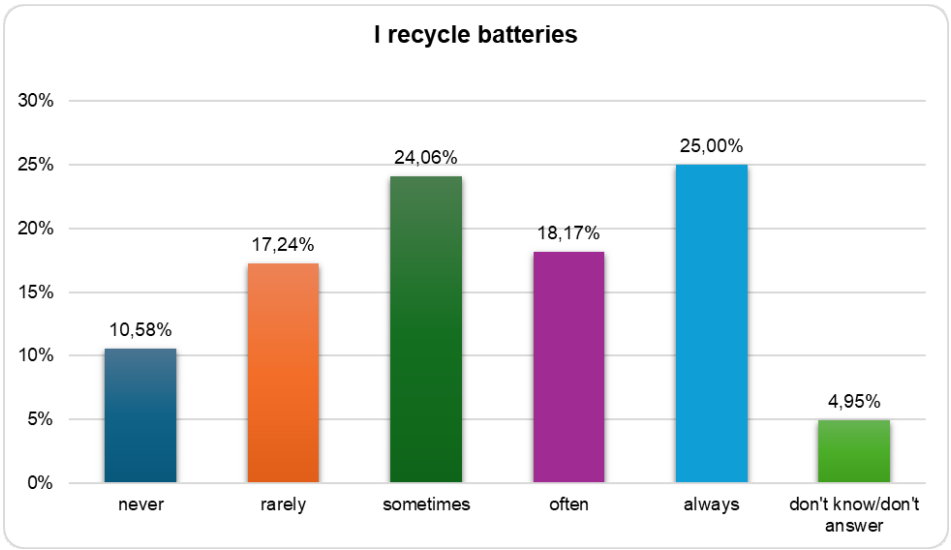


Figure 6.8. Battery recycling

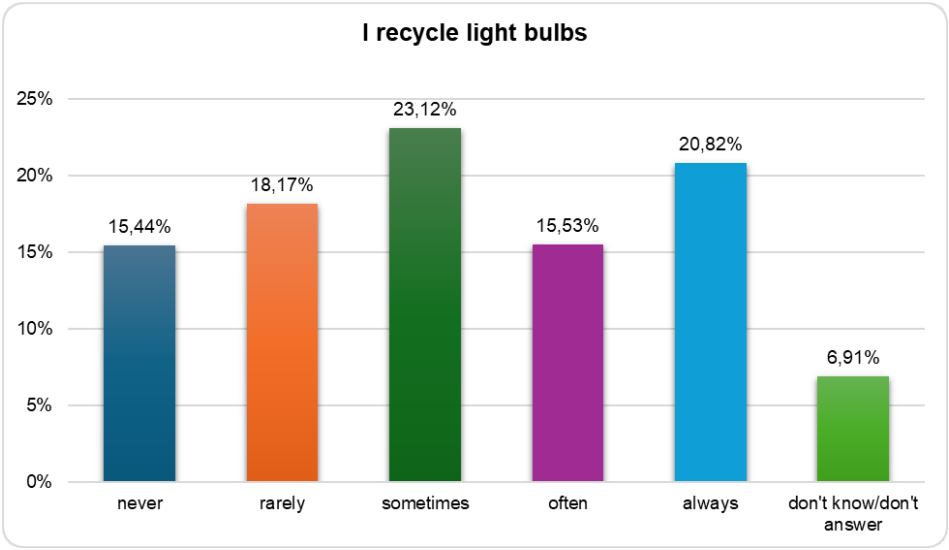


Figure 6.9. Light bulbs recycling

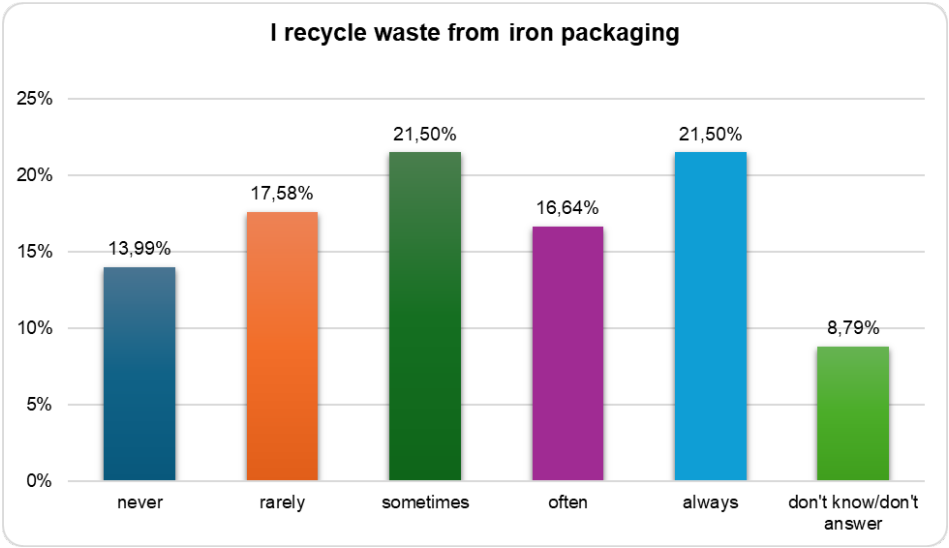


Figure 6.10. Iron waste recycling

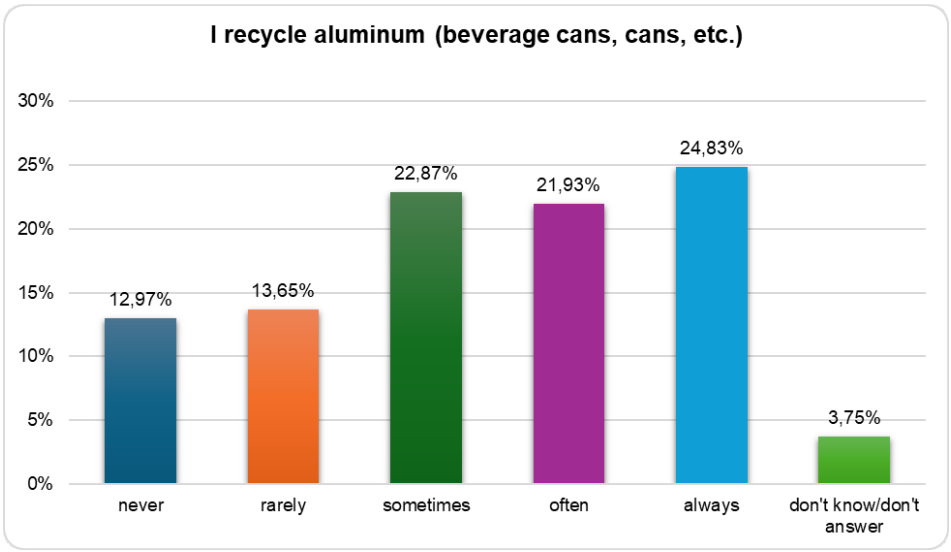


Figure 6.11. Aluminum recycling

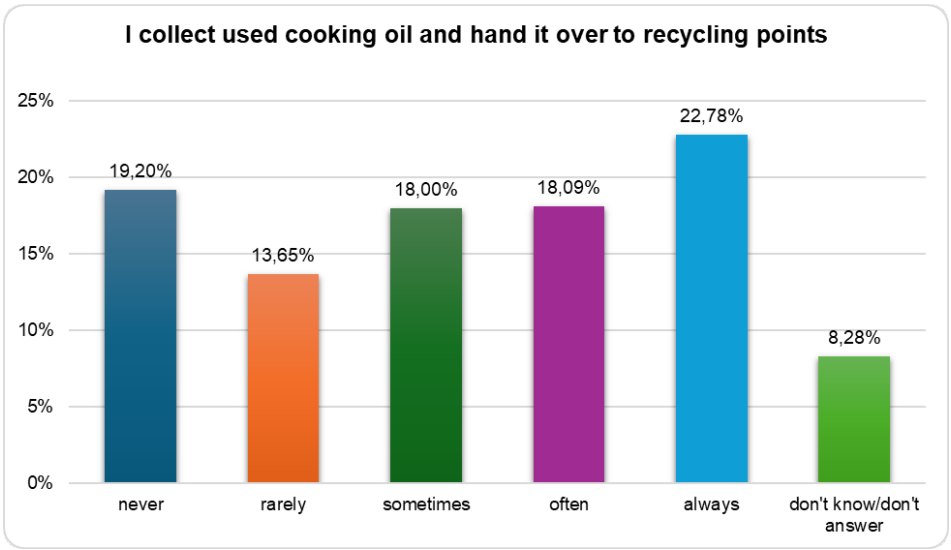


Figure 6.12. Cooking oil recycling

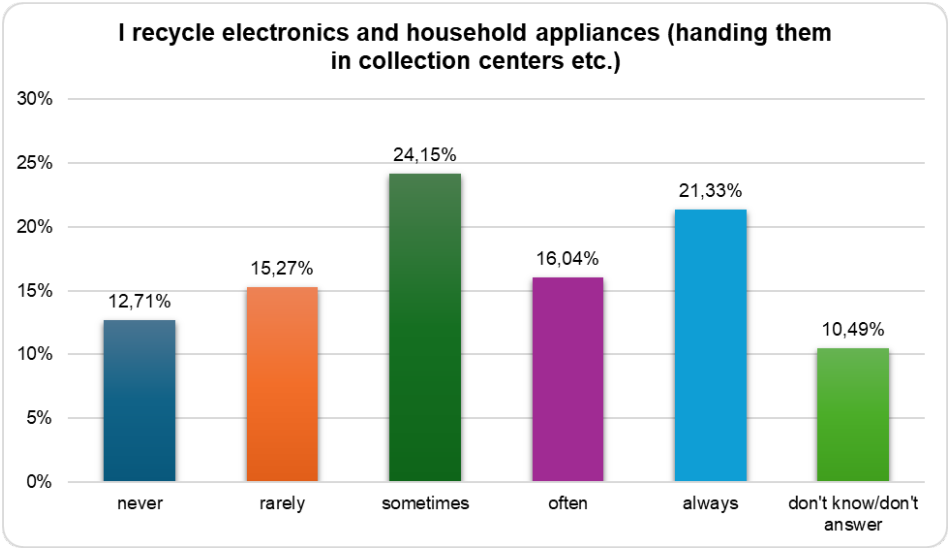


Figure 6.13. Electronics and household appliances recycling

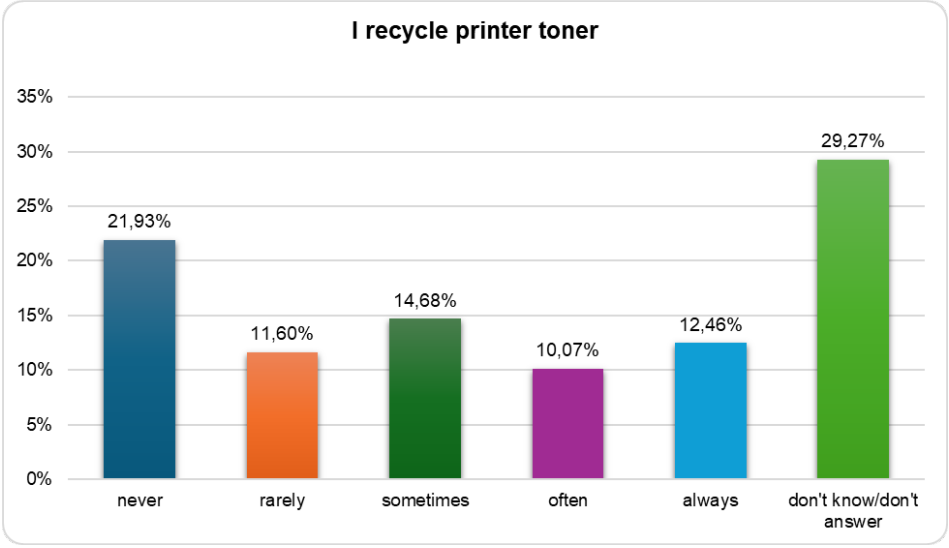


Figure 6.14. Printer toner recycling

Results in brief

1. Separate collection of household waste

- Most respondents (56.6%) selectively collect household waste to a large or very large extent, indicating a relatively good awareness of the importance of recycling.

2. Separate collection behavior in different premises

- A significant proportion of the students practice separate waste collection both at home (52.4%) and at school or work (71.9%), demonstrating an expansion of sustainable behavior in different settings.

3. Solutions for more efficient separate collection

- Respondents suggest that better collection organization (0.6%), information campaigns (9.2%) and more separate collection points (13.2%) could improve the efficiency of separate collection.

4. Recycling of various materials

- Glass and plastic containers are the most frequently recycled materials, with 60.2% and 65.4% of respondents recycling them often or always, respectively.
- The recycling of batteries, light bulbs, iron, and aluminum packaging, as well as used cooking oil is tackled in a variety of ways, with a higher proportion of participants declaring that they never or rarely practice recycling these materials.
- Electronics and home appliances are recycled by 37.3% of respondents often or always, indicating an awareness of the importance of recycling electrical and electronic equipment.
- Recycling printer toner is less common, with 22.6% of study participants practicing it often or always. A significant proportion of them (29.3%) do not know or do not answer this question.

7. Sustainability practices in the housing and learning environment in the UPT student dormitories

The section contains information on:

- Power saving practices: turning off the computer
- E-mail printing
- Eco-printing preferences: double-sided and black and white
- Optimizing paper use: two-sided copying
- Paper recycling
- Car sharing
- Printing educational resources

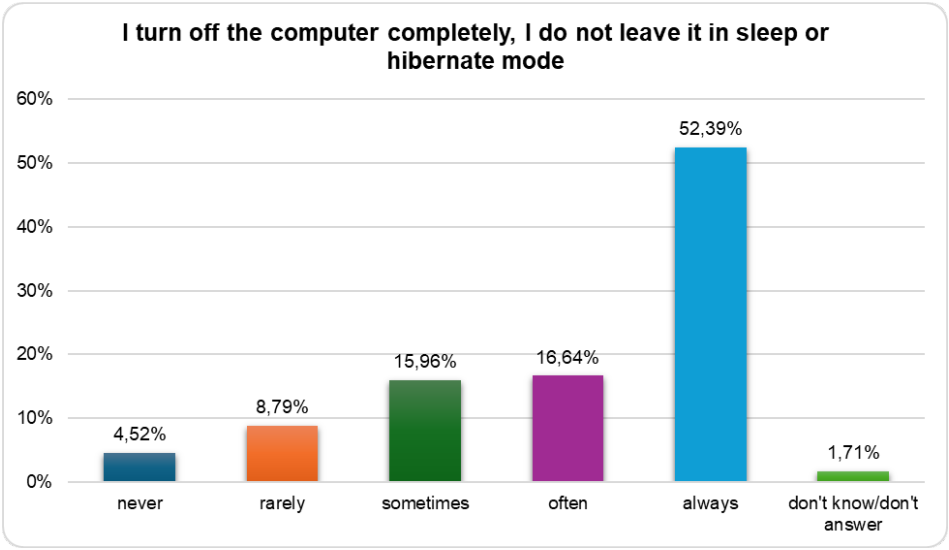


Figure 7.1. Power saving practices: turning off the computer

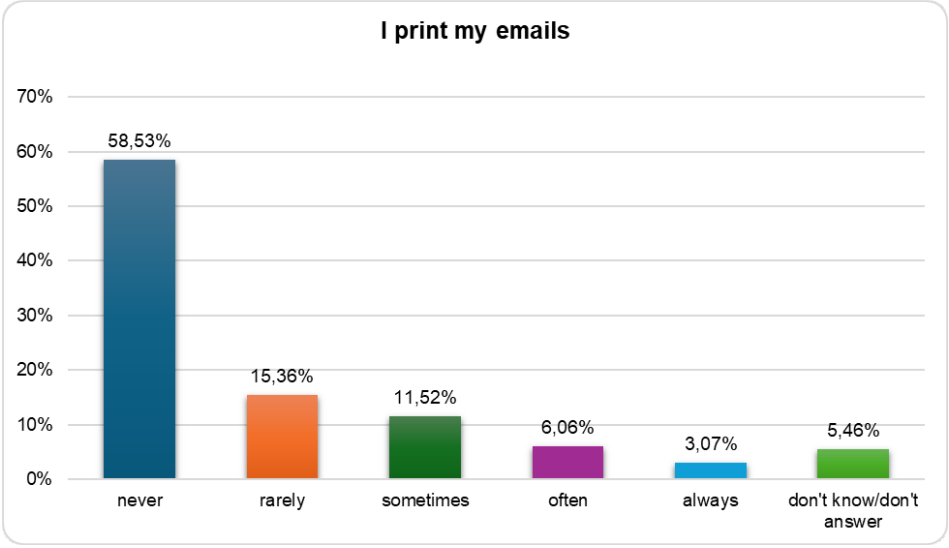


Figure 7.2. E-mail printing

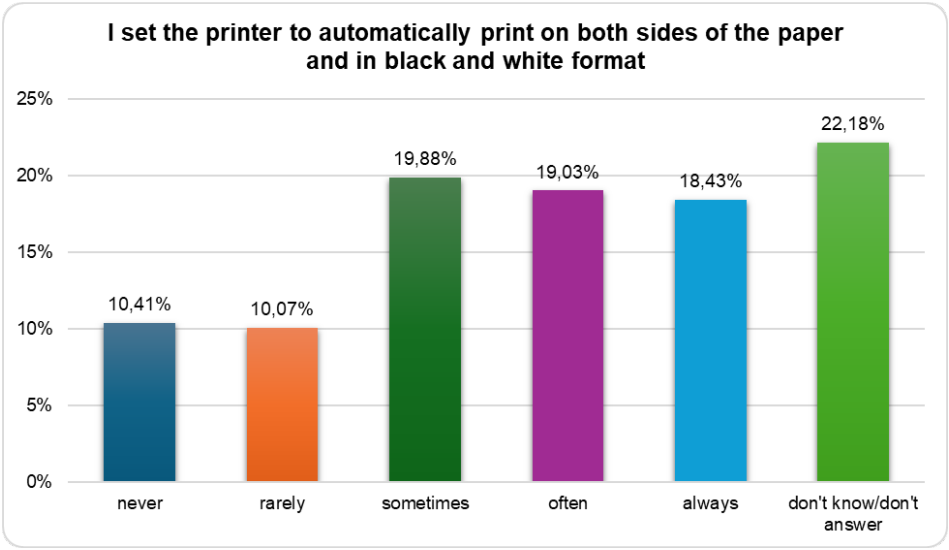


Figure 7.3. Eco-printing preferences: double-sided and black and white

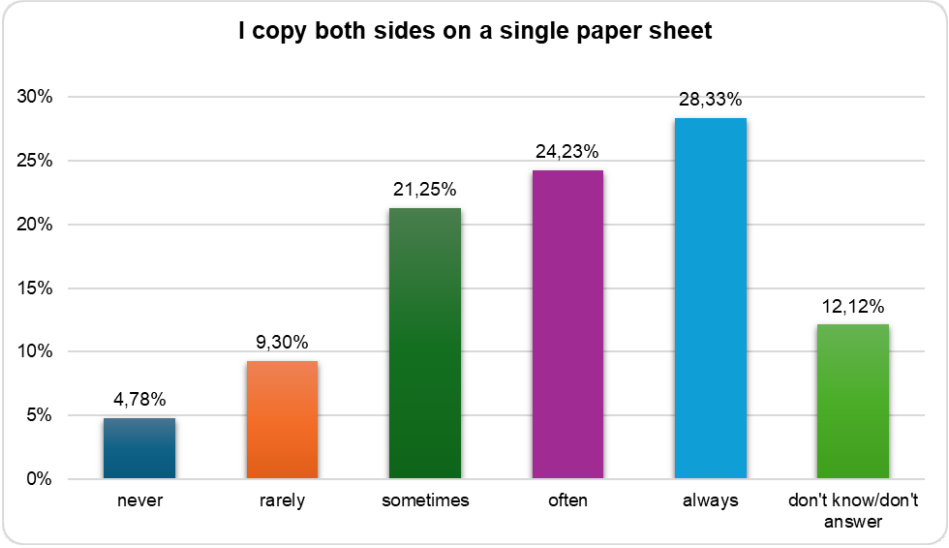


Figure 7.4. Optimizing paper use: two-sided copying

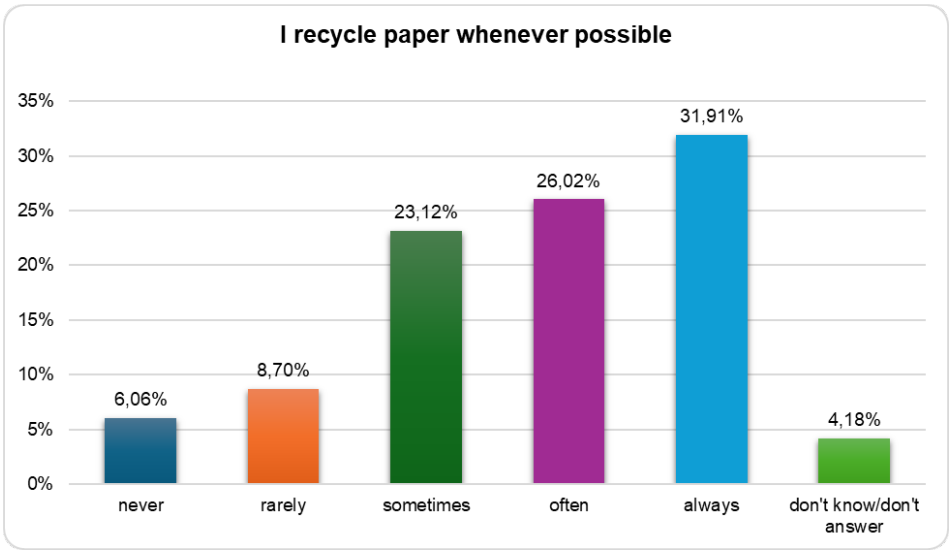


Figure 7.5. Paper recycling

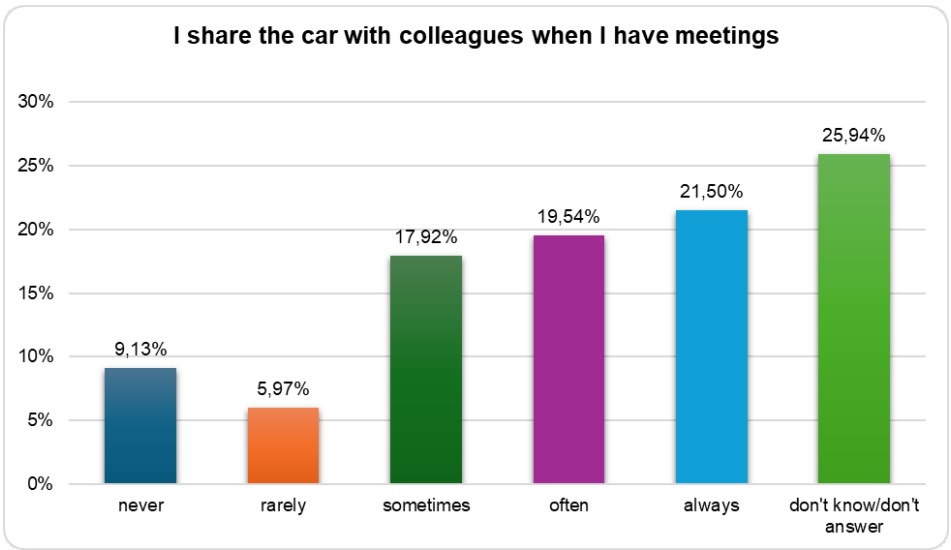


Figure 7.6. Car sharing

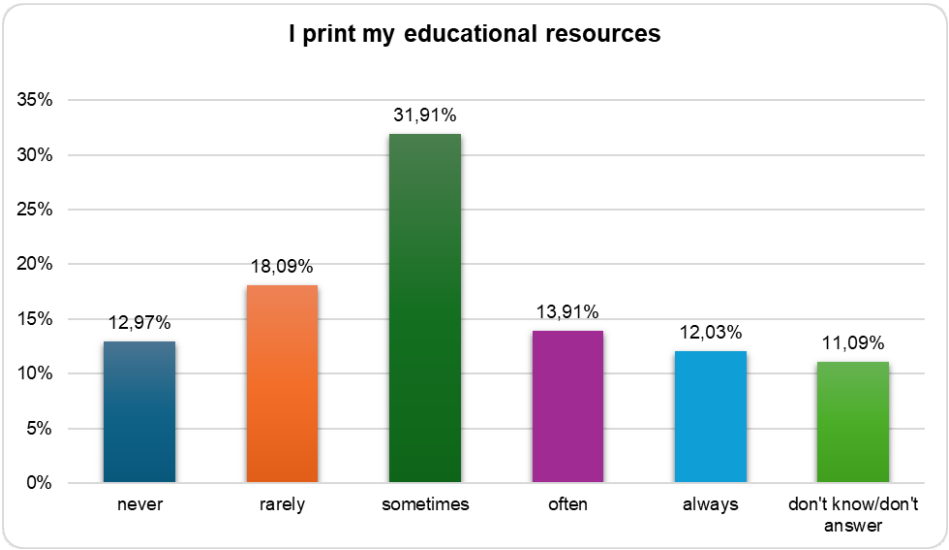


Figure 7.7. Printing educational resources

Results in brief

1. Power saving practices: turning off the computer

- Most respondents (52.4%) turn off their computer completely at the end of the day, demonstrating good power saving practice.

2. E-mail printing

- A large proportion of the students in the sample (58.5%) never print emails, indicating a preference for maintaining digital communications and reducing paper consumption.

3. Eco-printing preferences: double-sided and black and white

- Behaviors are varied, but 37.4% of respondents set the printer to print automatically in this way, helping to reduce paper and toner consumption.

4. Copying double-sided to a single paper sheet

- A significant proportion of the surveyed students (52.5%) often or always copy double-sided, showing an awareness of the importance of reducing paper waste.

5. Paper recycling

- The majority of respondents (57.9%) recycle paper often or always, highlighting a well-rooted sustainable practice.

6. Car sharing

- A considerable proportion of the respondents (41%) share their car with colleagues often or always, promoting a reduction in carbon emissions and traffic.

7. Printing educational resources

- Behaviors are varied, but a higher proportion of respondents (45.8%) print educational resources rarely or never, suggesting a trend towards the use of digital resources.

8. Commitment to environmental protection and energy saving in the UPT student dormitories

The section contains information on:

- Participation in voluntary cleaning actions
- Signing petitions for environmental protection
- Involvement in tree planting actions
- Donations to environmental organizations
- Personal motivation for saving energy
- The influence of smart technologies on energy saving
- Impact of individual consumption-related payment
- The influence of others on energy-saving behaviors
- The role of information in optimizing energy consumption

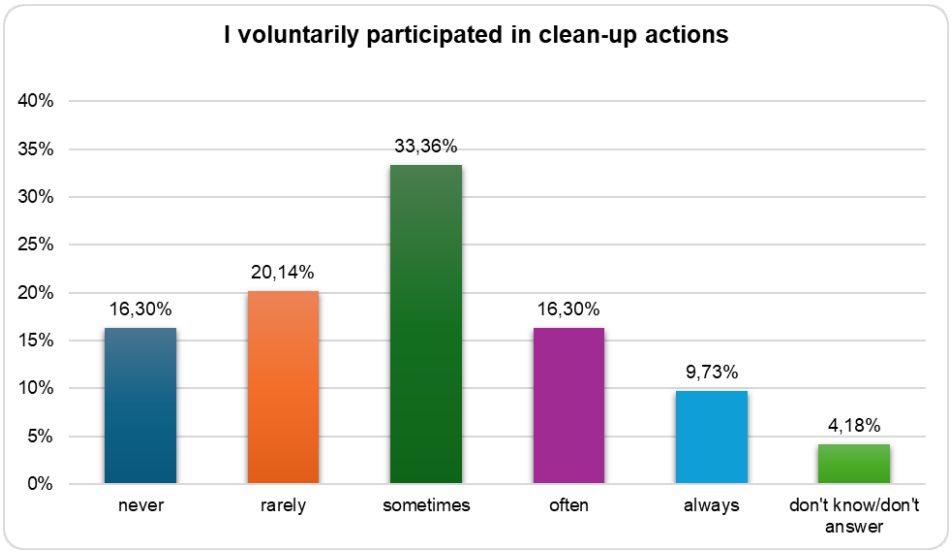


Figure 8.1. Participation in voluntary cleaning actions

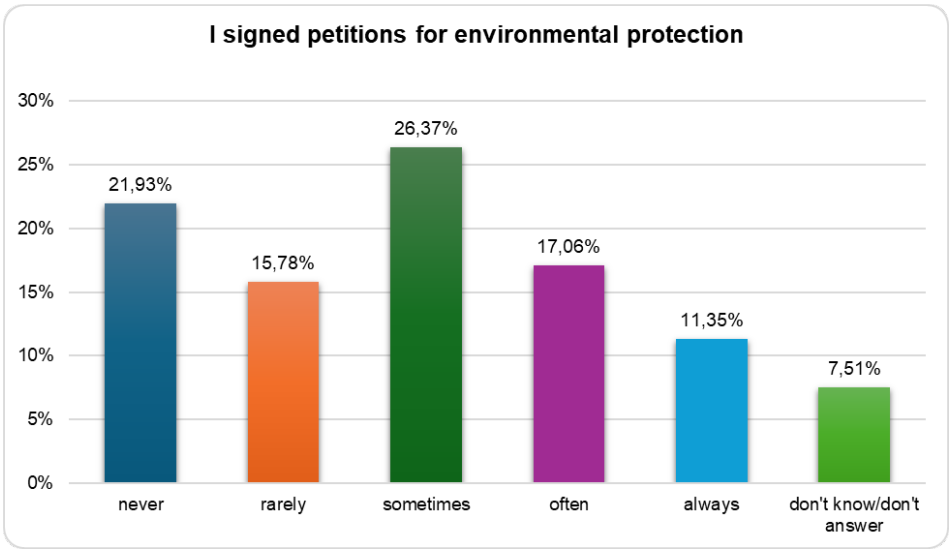


Figure 8.2. Signing petitions for environmental protection

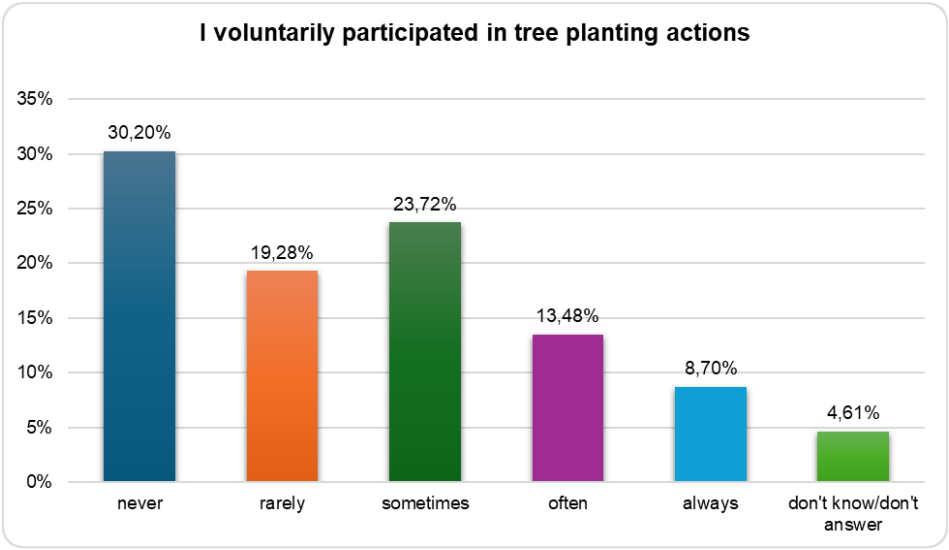


Figure 8.3. Involvement in tree planting actions

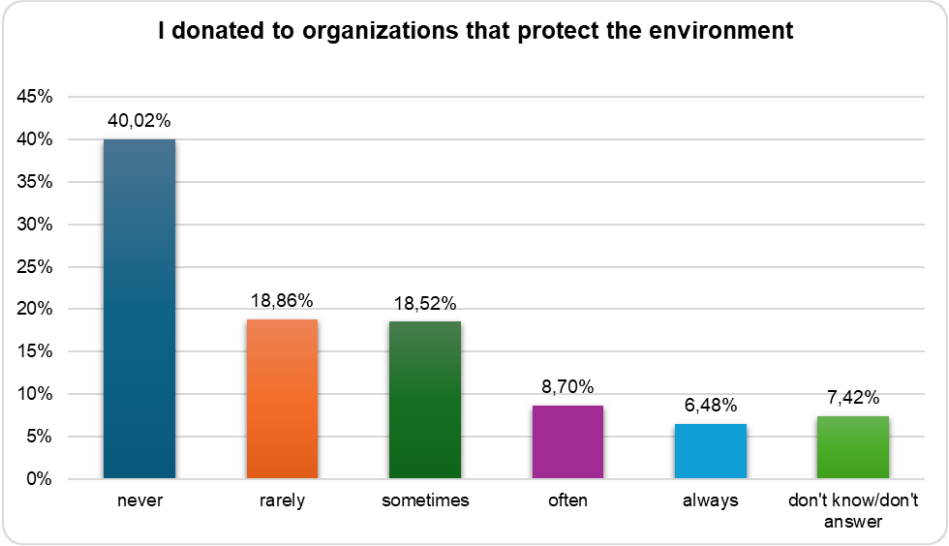


Figure 8.4. Donations to environmental organizations

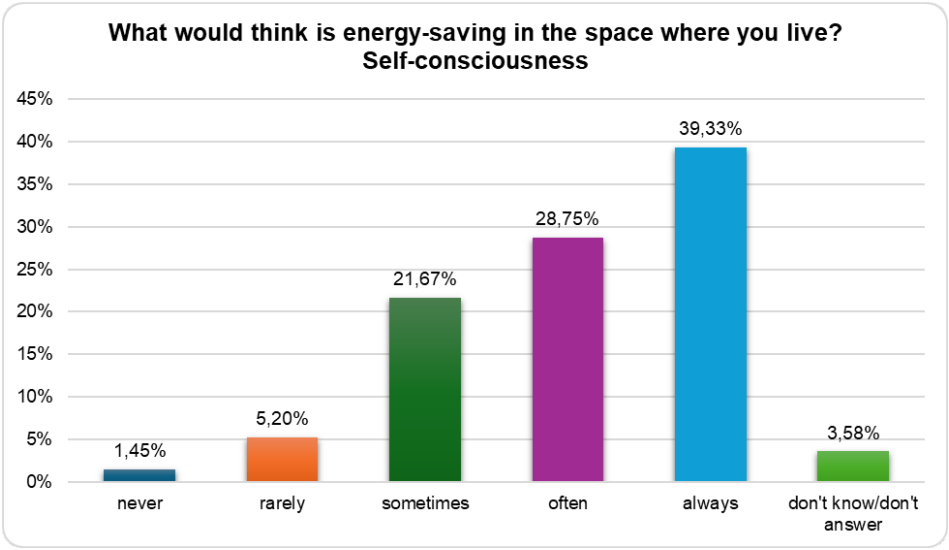


Figure 8.5. Personal motivation for saving energy

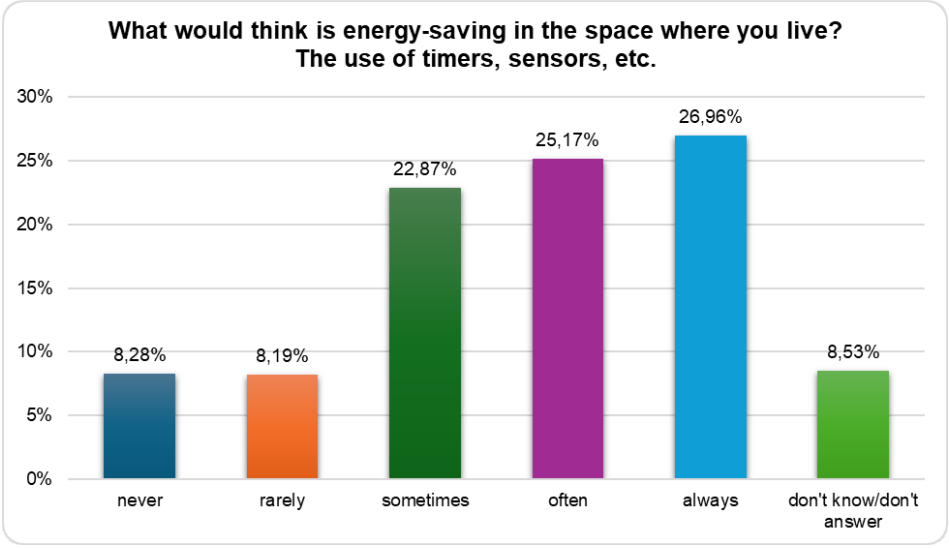


Figure 8.6. The influence of smart technologies on energy saving

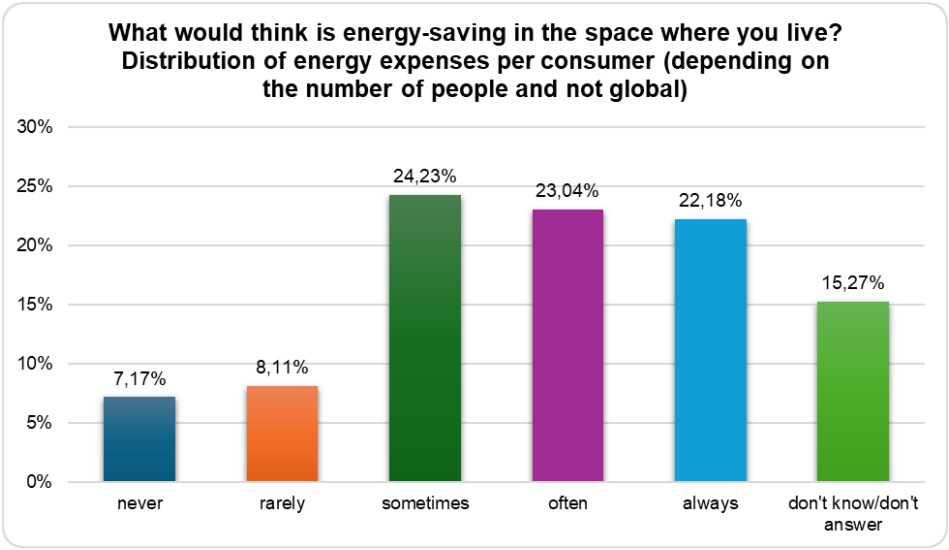


Figure 8.7. Impact of individual consumption-related payment

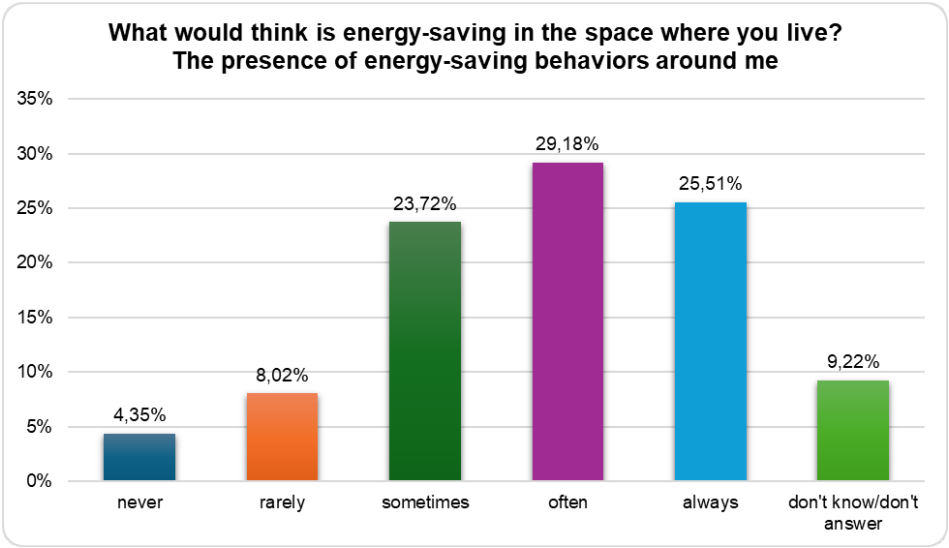


Figure 8.8. The influence of others on energy-saving behaviors

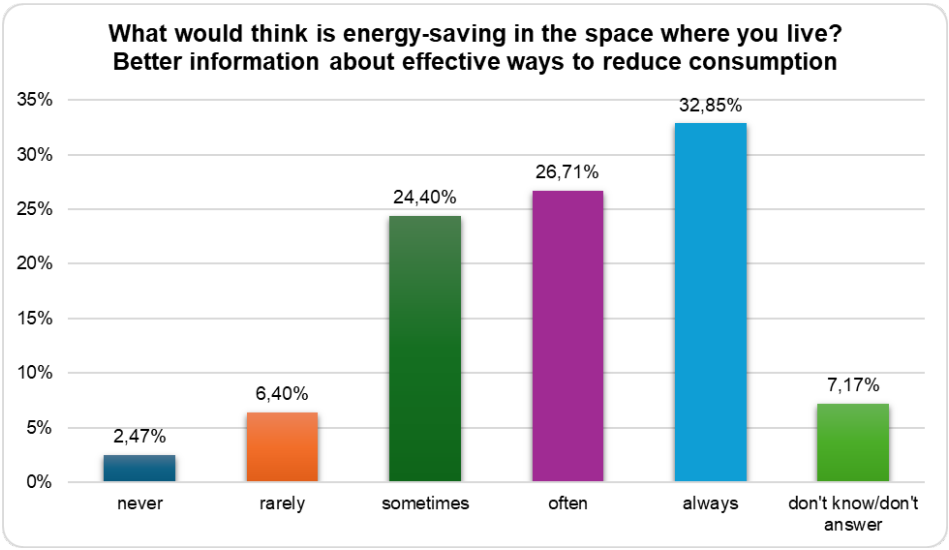


Figure 8.9. The role of information in optimizing energy consumption

Results in brief

Involvement in environmental protection

- **Cleaning actions:** A significant proportion of respondents (49.7%) have participated at least occasionally in cleaning actions, 9.7% of them always getting involved in these actions.
- **Signing petitions:** More than half of the respondents (54.8%) have signed petitions for environmental protection at least occasionally.
- **Tree planting:** About 37.2% of participants have at least occasionally been involved in tree planting actions.
- **Donations to environmental organizations:** The majority of respondents (40.0%) have never made donations to organizations that protect the environment, indicating an area where engagement can be improved.

Factors influencing energy saving

- **Self-awareness:** It is the main factor that causes study participants to save energy, with 39.3% of them stating that they always try to reduce energy consumption.
- **Smart technologies:** Around 52.2% of participants would be motivated to save energy by using smart technologies at least frequently.

- **Individual consumption-related payment:** Around 45.2% of the respondents would be more motivated to save energy if costs were shared per consumer.
- **The influence of others on energy-saving behaviors:** The presence of other energy-saving people motivates 54.7% of respondents to do the same.
- **Information about reducing consumption:** Better information would lead 59.5% of study participants to adopt energy-saving measures.

4.2. Technical measurements — basis for strategic decisions

Universities, as institutions at the forefront of promoting sustainability, should also provide models for calculating, monitoring, reporting, reducing or even offsetting their impact on the environment, or in other words, their carbon footprint. Some of the rankings attesting to the sustainability of universities explicitly require that institutions entering the evaluation also publish reports on their carbon footprint (STARS 2024). However, as Helmers et al. note, there is no specific standardized methodology for inventorying the sources responsible for producing carbon emissions and for objectively calculating the carbon footprint of universities (Helmers et al., 2021). The task of calculating the carbon footprint is all the more difficult, as a complex set of elements that depend on the university must be taken into account, such as investments in buildings, resource management, the balance between built heritage and green spaces, the types of activities that take place on campus, but also elements related to the geographical area and climate of the region where the university is located. The type and size of the institution are also relevant in calculating the carbon footprint. Santovito and Abiko provided recommendations on how to prepare the inventory of emission sources leading to the carbon footprint, identified relevant sources of emissions, and allowed better visualization of mitigation opportunities (Santovito and Abiko, 2018). Universities can reach zero carbon emissions, as proven by Leuphana University in Germany, which achieves this goal through maximum use of modern technology and overproduction of renewable energy on-site (Helmers et al., 2021), but, researchers warn, this effort moves the carbon footprint issue upstream, because of the materials incorporated into applied technologies. This can lead to long payback periods and unquantified effects for universities. Helmers et al. appreciate that almost every university in the world, regardless of its climate, focus and profile, can reach very low carbon footprints, based on political will, necessary investments and creativity (Helmers et al., 2021). But the target can only be achieved if it is pursued systematically, coherently, and strategically.

Most universities either assess the energy performance of built space, or infer their carbon footprint based on mathematical models, taking into account students' consumption habits or, more broadly, the type of sources that impact the environment (Rodrigues-Andara et al., 2020; Valls-Val and Bovea, 2021; Sippel et al., 2018; Xiwang Li et al., 2015; Ozawa-Meida et al., 2013).

The USE-REC project aimed to implement innovative strategies for collecting and analyzing data on students' energy consumption in the university campus environment, but also to establish reference points to substantiate efforts to reduce the carbon footprint of the campus as a whole. The collected data and the established

correlations can serve as a foundation for the development of educational initiatives and practical actions to reduce the environmental footprint of the university community of the Politehnica University of Timisoara.

Timisoara is located in the western part of Romania, close to the borders with Serbia and Hungary. It has a temperate-continental climate with cold winters and hot summers. Over the past two decades, extreme records have reached -24 °C in January 2003 for cold and +41 °C, set in July 2007 for heat. Such a variation in outdoor temperature puts pressure on energy consumption, since in winter it is necessary to heat the spaces, and in summer – to cool them, to ensure the necessary thermal comfort. Under these circumstances, consumption control strategies must take into account the environmental factor, not only the technical characteristics of the buildings or the behavior of the occupants of the respective buildings.

Along with the point of view of the institution's management representatives, dormitory administrators and students, aspects collected through individual and group interviews, results described in the specific chapters, we completed the starting point database of the project with a monitoring of student consumption in three areas: water consumption, electricity consumption and thermal energy consumption. The data were provided by the relevant technical service of UPT during the project months, compared to the consumption data of the previous year, to allow the evaluation of changes in the behaviors of residents in the dormitory (if they occurred). This monitoring of consumption and comparisons with the year prior to unfolding the project allowed the project team to create a profile of the

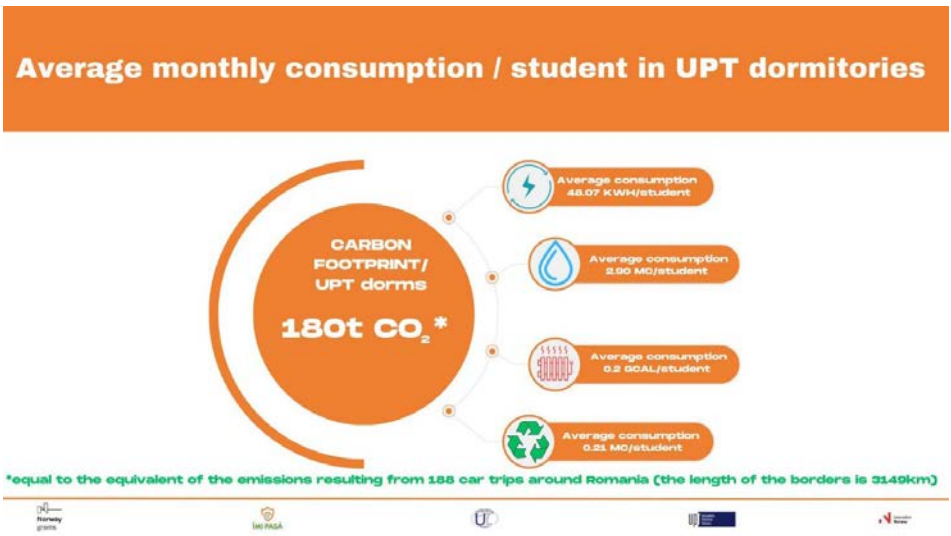


Figure 1. Average monthly consumption per student on UPT campus

student as a consumer of utilities. Also, these activities helped establish a ranking of dormitories according to the saving of resources reflected in consumption, as a result of the information and persuasion campaigns.

The communication of these data made students more aware of their personal carbon footprint (Sippel et al., 2018) and understand the consequences of everyday habits, which can be steered towards a more judicious use of resources.

The data from the monitoring of consumption was completed by an assessment of energy losses in the UPT student complex, by thermal scanning of residential buildings. Literature appreciates this method as non-destructive and non-invasive, capable of detecting potential problems in built structures, machinery, or infrastructure. In the case of the Politehnica campus, the use of thermal scanning provided data on irregular heat distribution, identified potential insulation defects and loss points, allowing the elaboration of an intervention plan based on a thorough documentation of the situation in the field, adapted to the specific features of the buildings concerned (Fishermen et al., 2016). The main disadvantage that makes this method rarely employed in the process of assessing the sustainability of universities is the relatively high cost of the procedure, correlated with the necessary logistics (approvals related to the use of airspace, temperature conditions, vegetation, presence of ample glazed surfaces). For the scanning performed within the project, the team in charge of the process undertook the steps described below.

Selection of dormitories for thermal scanning and field data collection

The purpose of the project was also to identify energy losses, propose solutions for energy efficiency and to reduce the carbon footprint of student dormitories in the Student Complex in Timisoara.

The methodology for selecting the dormitories for thermal scanning involved a careful and rigorous approach, considering the use of both terrestrial and aerial measurements. The main aspects taken into consideration were the analysis of airspace flight restrictions and the identification of an optimal area for scanning, in line with the objectives of the project. Also, the diversified choice of dormitories allowed the team to obtain representative data for different types of construction and uses, thus supporting the objectives of energy consumption analysis.

The technical team performed thermal scanning operations with both the terrestrial scanner and the drone equipped with a thermal camera, depending on the technical specifications of the equipment. The process also included precise measurements using the Leica TS1205 Total Station and the South G1 Plus GNSS receiver to ensure precise geographic control and reference of collected data. This approach ensured efficient data collection in line with the objectives of the project, in compliance with safety rules and regulations in force in the field of air drone operations.

Aerial measurements and data processing

In the first stage of the project, a flyover of the Timisoara Student Complex was conducted, using the drone's RGB camera. This overview provided a detailed picture of the entire complex, allowing the team to identify the general characteristics of the infrastructure and obtain a global perspective on the area of interest. The photos captured with the RGB camera provided clear and detailed visual information about buildings, green spaces, and other elements of the complex, thus preparing the ground for a comprehensive assessment of energy efficiency. Once the team completed the overall analysis, attention moved to the detailed flyover of the target dormitories, using the drone equipped with the Flir Vue Pro 640R thermal camera. This phase allowed the exploration of specific thermal aspects of buildings, highlighting temperature variations and identifying potential heat loss or thermal anomalies. The high-resolution thermal camera provided accurate and reliable data, helping to assess energy efficiency and identify possible areas for improvement in thermal insulation or heating systems. The combination of RGB and thermal visual data provided a holistic perspective, consolidating the information needed to develop effective strategies for assessing the energy efficiency of campus buildings and designing future interventions.

Conclusions of the thermal imaging action performed with the thermal camera FLIR VUE PRO R (UAV)

The scanning showed that there are no large areas with significant heat loss on the roof frames of the analyzed buildings. The most significant heat loss was in a roof area at dormitory 23C. The technical team recommended checking the area and repairing it. In the other areas, with thermal leaks of 1–2 degrees Celsius, intervention can be made to reduce them by applying cotton wool insulation on the inside of the roof, thus contributing to the overall improvement of the energy efficiency of the structure.

Terrestrial laser scanning and data processing process.

The technical team processed the data acquired in the field and obtained the final products from terrestrial laser scanning with two specific software: Z+F LaserControl and CloudCompare. The Z+F LaserControl allowed for generating point clouds. Their coloring in RGB format was also generated and temperature attributes specific to each point were added, as can be seen from the figure below.

Figure 1. Facade with temperature attributes obtained from final processing

For each dormitory, scans were made by performing multiple stops so that all the details of the building could be captured, resulting in between 6 and 11 scans for each building. For georeferencing point clouds and translating them into a unitary system, fixed targets were used and measured using the Leica TCR 1205 R400 total station. The technical team made sure that at least 3 targets were measured for each scanning station, so as to ensure a good alignment on all three dimensions X, Y, Z and the possibility of additional checks.

Conclusions of thermal scanning actions

Following the scanning process and the detailed analysis of the point clouds obtained both in RGB format and with temperature attributes, the following aspects were highlighted:

- Heat losses within all scanned objectives have low values and are unitary, being mainly caused by thermal losses at the level of the building foundation, door, and window gaps.
- A greater loss of heat in the area of the foundation can be explained by several factors. The foundation is in direct contact with the ground, which may have a lower temperature than the temperature inside the building. Also, the foundation can suffer heat loss through convection and thermal conduction.

To reduce these heat losses and contribute to energy efficiency, the following measures can be taken:

- Thermal insulation of the foundation: Adding a layer of thermal insulation around the foundation can help reduce heat loss. Insulating materials such as polyurethane foam or expanded polystyrene can be used to create a thermal barrier between the foundation and the ground.

- Underground insulation systems: Underground insulation systems consisting of special insulating materials or piping systems that reduce heat transfer between the foundation and the ground can be used.
- Proper ventilation: Good ventilation under the floor can help maintain a constant temperature and prevent moisture buildup, which can contribute to heat loss.
- Assessment and repair of cracks: Any cracks or crevices in the foundation can allow significant heat loss. It is important to conduct regular inspections and perform the necessary repairs.
- Underfloor heating systems: The use of underfloor heating systems can help maintain a more constant temperature inside the building, helping to reduce the need for foundation heating.
- By implementing these measures, heat loss at foundation level can be reduced and a significant contribution can be made to improving the energy efficiency of the building.
- When the windows are closed, heat loss can be observed especially in the upper areas, but also in the lower areas in situations where the radiators were operating:

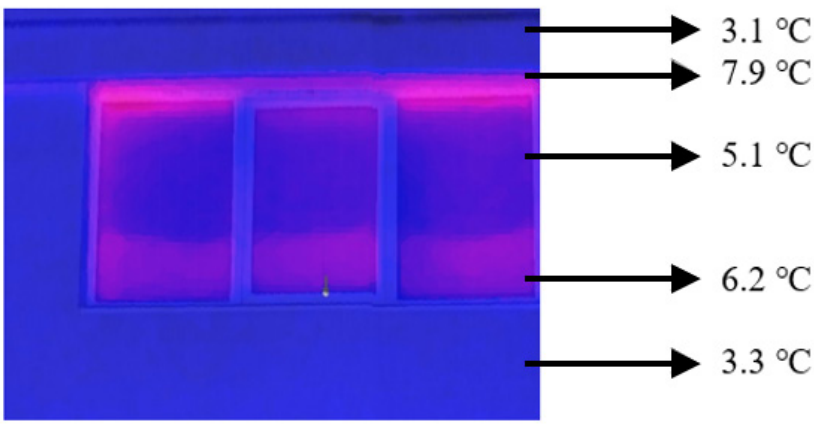


Figure 2. Example of heat loss when the windows are closed.

When the windows were open, the temperature differences between the wall area and the glazing were significantly greater:

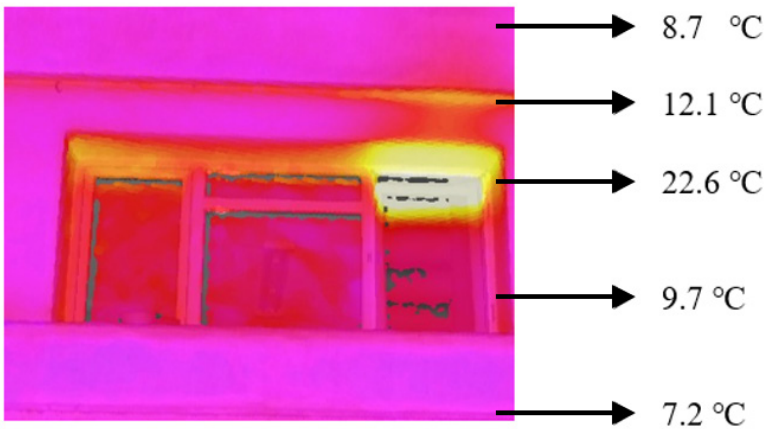


Figure 3. Example of heat loss when windows are open.

The heat losses were similar on the long and short sides of the dormitories, the temperatures varying only depending on the ambient temperature that changed during the measurements. However, one can observe in detail the areas where heat loss occurs. A special case could be seen on the west side of the 22C dormitory, with exposed brick elements on the façade. In this area, higher heat losses can be observed compared to areas with insulation, with heat losses especially in the area of the slabs between floors, but also on a large area in the basement / foundation area:

Also, heat losses were recorded at the foundation level, this observation being valid for all scanned dormitories.

All the presented data can be analyzed in detail with the help of the open program CloudCompare, which is a software specialized in visualizing point clouds.

The action of thermoscanning the buildings on the student campus was a useful action for the project and for the university in outlining future actions for adequate insulation of buildings and their foundations, respectively other actions to reduce heat loss. For the coming years, the technical team recommended a periodic repetition of thermoscanning actions to timely correct the energy losses of the buildings on the student campus, which may still occur. It also recommended to extend thermoscanning actions to all buildings of the Politehnica University of Timisoara.

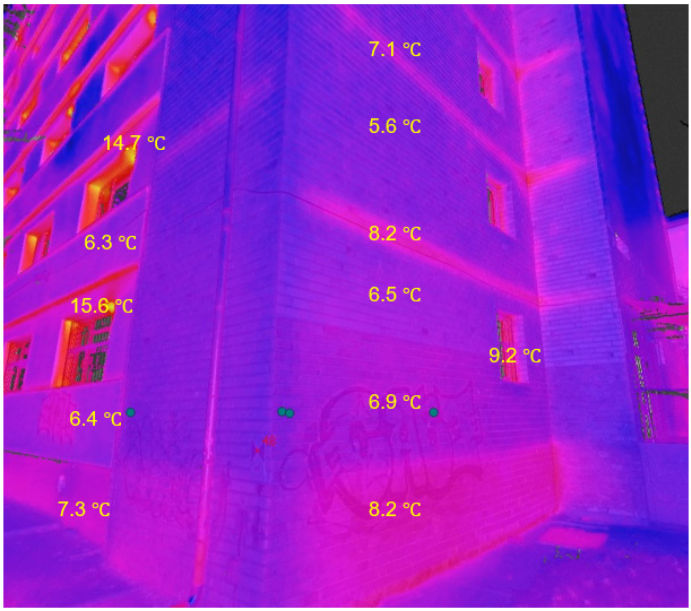


Figure 4. Example of heat loss on the west side of the dormitory 22 C

In addition to the technical diagnosis, thanks to which an intervention plan can be made for the building enveloping, a significant method of reducing the carbon footprint of the campus, also revealed by the specialized literature, is to change the used energy source. In 2024, UPT accessed a project financed from the funds of the Ministry of Energy, aimed at installing a photovoltaic system at 17 buildings of the Politehnica University of Timișoara (student dormitories, faculty buildings, administrative buildings), with an installed capacity of 1.5 MWh. The path to ensuring the sustainability of the campus is ready, in all its components.

5. COMMUNICATION FOR SUSTAINABILITY: INFORMATION AND AWARENESS CAMPAIGNS

Adina Palea

The USE-REC project was won and implemented in a favorable period for interventions in support of sustainable development. The international context shows an intensification of efforts to achieve the sustainable development goals assumed by the United Nations 2030 Agenda, with research revealing that only „15% of the targets have been achieved" by September 2023 according to the Secretary-General of the United Nations, António Guterres 2023, SDG Summit).

Regarding the Romanian landscape, we notice that sustainability has become a „buzzword" used by opinion leaders, journalists, professionals from different fields and, of course, communication specialists. Concerns about sustainability are visible in the strategies of companies, the operational plans of institutions, the names of events, the texts of advertisements and even in the educational offer of universities.

In the Politehnica University of Timisoara, sustainability can be found in the rector's management plan as a separate chapter, and at the administrative level as an area of competence and responsibility assumed by one of the vice-rectors of the institution (the portofolio of Investments, heritage and sustainable development, starting with the 2024–2029 mandate). Moreover, Politehnica University Timisoara has constantly assumed a role as a formative leader at the community level and as a vector of development, including through the early adoption of European values (Cernicova et al., 2014, p. 100), of international scientific and economics models.

The core of the implementation team is made up of teaching staff from the Faculty of Communication Sciences, who share the belief that the link between all initiatives and concerns for sustainability is Communication, respectively that through information and awareness campaigns, behavior changes can be achieved in the direction desired by the society. Public relations and marketing are the disciplines actively involved in driving positive change to build a more sustainable future.

These concerns are found under the umbrella of social marketing, defined by the German specialists Manfred Bruhn and Jörg Tilmes (1989) as "planning,

organizing, implementing and controlling the marketing strategies and activities of non-commercial organizations, which are designed, directly or indirectly, for solving social problems". According to the authors, communication for sustainability is often limited to providing information. However, researchers warn, raising awareness of a problem does not automatically lead to the implementation of actions to change the situation. To put society on a truly sustainable path, people must not only become aware of the need for sustainable choices, but also change their behavior. The premise of sustainability communication is that national and local authorities can bring about this change through emotional, personal and practical communication – partly through attractive and effective campaigns that make sustainable lifestyles fashionable and 'cool' – combined with good policies and infrastructure to enable people to make the right informed choices. (2006, Communicating Sustainability: How to Produce Effective Public Campaigns| La Iniciativa de Comunicación (comminit.com)).

The implementation of such measures contributes to increasing consumer awareness of environmental issues and forces brands to strategically use sustainability as a key component in their marketing efforts (Digital Media Team, 2023). At the same time, social campaigns are an important tool for promoting positive change in social attitudes (in ecology, health prevention, promoting tolerance, etc.). Improving their efficiency can therefore have a tangible effect on many aspects of life – both for individuals and for society as a whole. Social campaigning, also known as public awareness campaigning, is defined as „a comprehensive effort that includes multiple components (messaging, media relations, government affairs, budgeting, etc.) to help achieve a specific goal " (Scarlet, 2013). Typically, a campaign attempts to raise awareness of a key issue and induce a desired positive behavioral change (Coffman, 2002). Among the most widespread activities carried out within social campaigns, we can mention: communication campaigns, press publications, distribution of brochures, the organization of events, happenings or more direct educational actions. They also include advertising through different types of media – television, radio, internet and print, thus drawing the attention of a wide audience to the issue (Borawska, 2018), requiring innovation skills to shelter the audience from the feeling of "deja vu " in receiving broadcast messages (Palea, 2010; Ahmed et al., 2020).

Campaigning as a process is universal across all subjects and locations, systematically utilizing fundamental strategic frameworks and principles developed over the past half century. Campaign designers perform a situational analysis and establish objectives that lead to the development of a coherent set of strategies and implement the campaign by creating informational and persuasive messages that are disseminated through traditional media, new technologies, and interpersonal networks (Atkin, 2012).

Public communication campaigns are an attempt to shape behavior toward desirable social outcomes. These behaviors can include eating right, drinking less, recycling, breastfeeding, reading to our children, getting a mammogram, voting or volunteering. The final objectives of the campaigns are the formation of behaviors or the adoption of policies that lead to the improvement of life for individuals, families and communities (Coffman, 2002, p.5).

The **University Students Engaging in Responsible and Sustainable Energy Consumption (USE-REC)** project offered the opportunity to test different types of communication campaigns and evaluate the effect produced among the main target audience – the students from the dormitories of the Politehnica University Timisoara. The results are inspirational and represent a benchmark for the development and implementation of other projects on the theme of responsible consumption of resources. At the same time, regarding the secondary audience categories, the project's conclusions are encouraging for the way in which universities, public utility providers, local authorities and the economic environment have collaborated to ensure modern, sustainable student campuses, oriented to the current and future needs of the young generations. The events, meetings and debates mediated by the project led to the creation of synergy between the initiatives and to the acceleration of the implementation of sustainable development objectives in the Politehnica University Timisoara, the Politehnica Foundation and in the local community.

To maximize the involvement of all stakeholders, we opted to apply the three-step CBE (co-create, build, engage) model proposed by Rundle-Thiele et al., as an extension of social marketing applicable to changing social behavior with environmental benefits. The key force that social marketing brings to the areal of social change is the development of something of value, which motivates and mobilizes people to voluntarily change their behavior, realizing that the effect of the new behavior benefits, directly or indirectly, the person, the society, but also the planet (Rundle-Thiele, 2021).

The benchmarks for social marketing were first proposed by Andreasen (2002) and were further expanded to eight benchmarks by the National Center for Social Marketing (2024), which should serve as principles for social marketers to qualify their interventions as social marketing. Realizing that there is still little effort to apply the principles that distinguish social marketing from other behavioral science approaches, Rundle-Thiele et al. (2021) developed the CBE framework to serve as a three-step guide to designing, implementing, and evaluating a real social marketing program. Founded on the benchmarks of social marketing, the CBE Framework provides more than a general checklist to those looking to design and implement a social marketing program. The model proposes a guide with step-by-step instructions, signaling when each of the eight elements in the benchmarks

should be introduced for the first time throughout the entire process of developing an intervention (Lee, 2022, p.3).

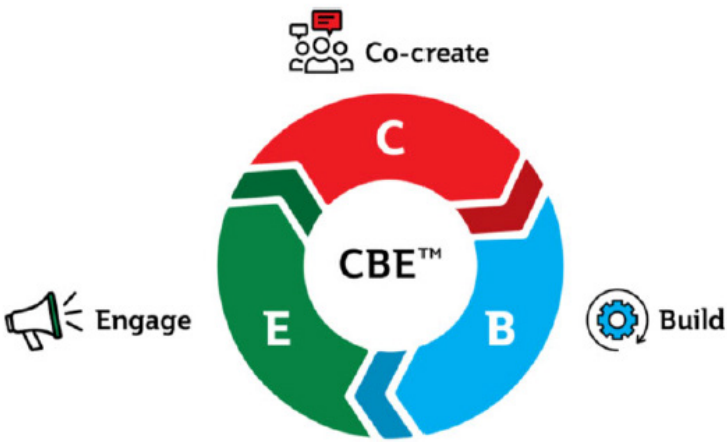
In the proposed model, programs are co-created (C) together with the people targeted by the issue and built (B) to create and embed lasting solutions, and ultimately engage communities (E) to participate in these programs. This linear process is applied when the program is first developed and the stages fade after the first implementation, as the CBE steps become continuous when programs are embedded in communities (Rundle-Thiele, 2021).

1. **Co-creation** ensures that programs are designed by and for people, which helps deliver programs that empower people to make changes that benefit themselves and society.

2. Programs are **built** in consultation with stakeholders. Partnerships are formed to ensure that people and funds are available to support program delivery. Partnerships are built to expand the reach of programs to help engage more people.

3. **Engagement** is the final stage of the 3-step social marketing process. During the engagement stage, social marketers focus their efforts on:

- Making sure people are aware the program is available.
- Communicating the benefits that people and stakeholders will have.



CBE Model *source Rundle-Thiele et al., 2021, p.5.*

Depending on the objective, the communication campaigns carried out by the project whose flagship slogan was „I care" used different combinations of communication channels, types of messages and broadcasting frequencies of messages. There was a constant concern to identify and use predominantly ecological solutions, therefore the use of flyers, banners and pop-ups was avoided,

reducing the production of printed materials to a minimum. The focus fell on „green" solutions such as videos, online messages, electronic announcements, which involved both the use of the already existing communication infrastructure and the development, through the project, of a new appropriate and innovative communication infrastructure.

In the same logic of identifying sustainable information/promotion solutions, the majority of the offline information campaigns were based on participating with our own „I care" stands in the large, traditional UPT events. As it turned out, our stands became a point of attraction for the participants of those events. In addition to ensuring the presence of the project at the major events of Politehnica University Timisoara (graduation celebration in 2023, the start of the academic year, UPT Days, Career Days, 103 for Poli) the project team also created personalized events, part of the awareness/education campaigns, which focused public attention to core messages for sustainability in campus life.

We opted for the presentation of communication campaigns and events in a succinct form, similar to an evaluation sheet, with the campaign elements featured and the communication component highlighted. The model created can be seen as a source of inspiration, easy to understand and multiply. The presentation follows, on the one hand, the stages described by Rundle-Thiele, Co-create – Build – Engage, and on the other, it groups the steps undertaken according to the type of interaction with the target group: offline, online or mixed.

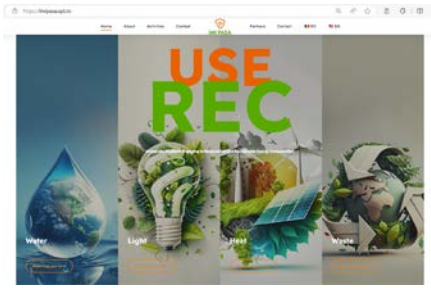
1. Co-creating

Development of the visual identity of the project, in consultation with the beneficiaries

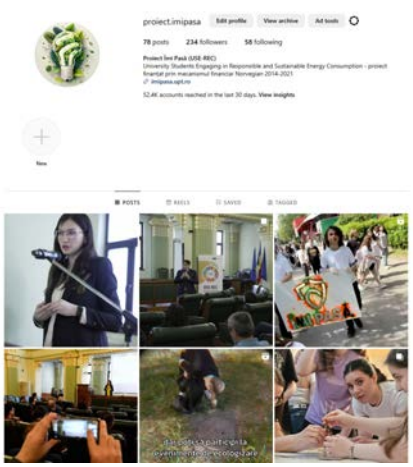
The visual identity of the project was based on the main message – „I care". We illustrated this idea by creating a shield to protect the values we stand for: concern for the judicious consumption of water, electricity and heat, respectively for the correct sorting of waste. The color scheme was inspired by the orange of the financing body and the green traditionally associated with environmental concerns.

The first communication channel activated was the web page, on which essential information about the project and its objectives were uploaded. Later, social media Facebook and Instagram accounts were developed, which grew organically, except for a few paid promotion campaigns (run in October – November 2023 and March – April 2024, respectively).

The logo and slogan were also discussed with the Norwegian partner during his first visit to Timisoara.



1.1. Web page 1.2. Project logo



1.3. Instagram page 1.4. Facebook page

1.5. Project header

Another important result of the co-creation stage was the preparation of a new lease contract for students, drawn up together with the administration of the Politehnica University Timisoara and representatives of the student associations. The contract entered into force starting from the academic year 2023/2024 and contains provisions on the responsibility of students regarding the consumption of water, electricity, thermal energy, respectively on the selective collection of waste. In the elaboration of the provisions, the opinions of the students and the dormitory administrators were taken into account, as well as the vision of the UPT management regarding the rights and obligations of the students who benefit from accommodation in the Politehnica's dormitories.

2. Building the team of sustainability ambassadors

Individual interviews and group interviews were conducted with all stakeholders and, subsequently, trainings were provided for each target group. Details of the research and training stages can be found in Chapters 3 and 4.

2.1. Summer school and trainings for students and building administrators

Date: 5–7 July 2023, 19–20 July, 13–14 October, 20–21 October

Event details: Ensuring a common knowledge fund that can support resource-saving behaviors, respectively reducing the CO2 footprint in campus life and activities.

Target group: students of the Politehnica University Timisoara, especially from the Faculty of Communication Sciences

Main objectives: training student sustainability ambassadors to support further project activities and confidently disseminate messages about caring for the environment. Making administrators aware of certain existing practices in the Campus, existing improvement solutions and the support they can count on in their endeavors.

2.1.1 Visit to the Water Museum in Timisoara

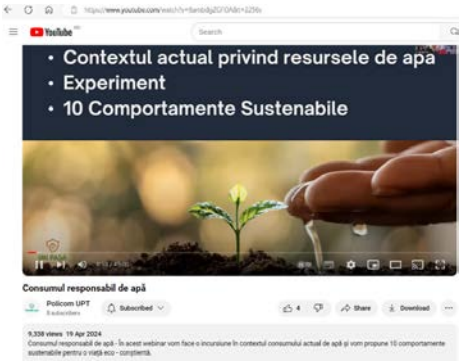
2.1.2. Lovrin research station

2.1.3. Day 1 of the Summer School

2.1.4. Design of Participation certificate

As a result of the experiences gained by the project team, we added to the training sessions a seminar for the development of sustainability skills for the workplace, held on the occasion of the spring edition of Career Days in UPT (2024), respectively a series of webinars under the slogan "I love the planet, I care about resources". The 6 episodes explain and promote the advantages of adopting a sustainable lifestyle. In the first two weeks after the creation of the YouTube channel and the posting of the webinars, the educational content was accessed by more than 8000 people.

The expected results aimed at increasing the target group's knowledge of renewable energy and energy efficiency, improving students' skills to adopt and promote sustainable and eco-conscious behavior.



2.1.5. Responsible water consumption

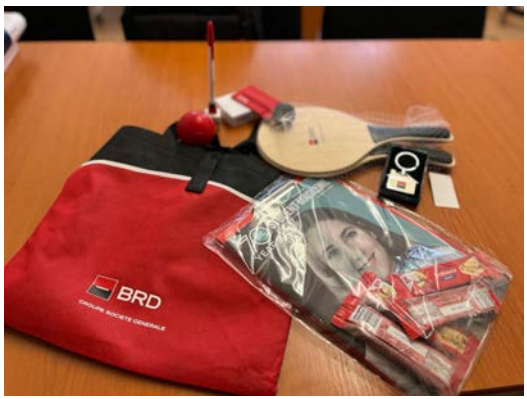
2.1.6. The webinar series

2.2. Development of additional partnerships

To expand the impact and help motivate students, additional partnerships were developed. One with the supermarket chain Profi, which offered vouchers for each of the 600 residents of the winning dormitory, the second with BRD, in order to further motivate students to participate in the video message contest about caring for the environment, and the third with Retim SA, the local sanitation company, to optimize the separate collection and management of recyclable waste in the student campus.

2.2.1. BRD – Groupe Société Générale

The project team initiated a partnership with BRD in order to offer the winning students of the video message contest an even more attractive package. The bank's representatives were immediately open to collaboration. The contents of the offered package can be seen in the image below.



The contents of the package offered by BRD

2.2.2 Profi Rom Food SRL

The openness towards information/awareness projects aimed at the topic of sustainability could also be observed through the sponsorship offered by the Profi supermarket chain to each student from the winning dormitory. The purpose of this support was based on the pro-environmental campaign of the commercial chain, which wanted to illustrate that it „puts soul into the environment". The sponsorship provided was cross-publicized, both on the project's and the partner's communication channels.

2.2.2.Handing out the vouchers offered by Profi

2.2.3 Retim Ecologic Services SA

The educational component of the students living in dormitories was supplemented by the partnership with Retim, which offered, through a pilot project, 2000 yellow bags, informative materials on the correct sorting of waste and specialized trainings. Politehnica University aided the initiative and purchased metal devices necessary to facilitate the use of recycling bags for paper, cardboard, plastic and aluminum.

2.2.3. Example of a graphic layout for the campaign supported by Retim

3. Engaging beneficiaries in dedicated campaigns and activities

Offline campaigns

3.1. Alumniversum graduation event

Date: 1 July 2023

Event details: The Alumniversum graduation ceremony has been organized since 2020 on the „Science" Stadium of Politehnica University Timisoara, being a national benchmark for this type of event Home – Alumniversum 2023 (upt.ro)

Target group: graduates of 2023, their families and friends.

Main objectives: to increase the visibility of the project, to raise awareness of the impact each one of us has on the environment, to collect messages for a „greener future" that will constitute an additional benchmark regarding the knowledge and concerns recent graduates have about the environment.

Participants: approximately 1000 people, graduates of all 10 faculties of the Politehnica University Timisoara, their families and friends, representatives of the academic environment, representatives of the economic environment.

Communication channels: via images – through the photos offered to the graduates, in writing – through post-its with messages written by graduates, orally – through the project team.

Activities: setting up a dedicated stand, taking instant photos that encompassed the visual identity of the project and offering them free of charge to each person caught on camera, collecting messages for the future and building a pane with the messages of the graduates.

Results: approx. 400 people receiving photos, over 70 messages written by graduates, 1000 people who came into contact with the stand and the project team.

Conclusions: the USE-REC stand represented an important point of attraction within the Graduation Ceremony and had a direct impact on the people caught on camera, the graduates who wrote a message for the future, respectively all those who passed by our stand and read the messages for a greener future. Messages such as „save nature", „more O2, less CO2", „green is the new sexy" or „give up PET Beer. It's better in a bottle anyway" show the young generation's concern for the future of the planet.

3.1.1. The project core team by the message pane

3.1.2. Graduates waiting to have their photo taken

3.1.3. Word cloud generated with graduates messages

3.1.4. Participants at the graduation ceremony

3.2. Start UPT

Date: 22 September 2023

Event details: Start UPT is the opening event of the academic year, dedicated to first-year students. It spans over a weekend full of activities of interest to freshmen – from official speeches to concerts, from meetings with UPT's partner companies to visiting of some cultural centers (6) StartUPT // Bun venit în Universul Politehnicii!| Facebook

Target group: first-year students of Politehnica University Timisoara, representatives of all student associations present at the stadium.

Main objectives: enhancing the project's visual identity, promoting the project's social media pages, launching the video message contest.

Participants: approximately 800 people from the 10 UPT faculties.

Communication channels: via images – through the photos provided free of charge, in print – through flyers with information about the video-message contest, orally – through the project team and project ambassadors.

Activities: setting up a stand, taking instant photos that encompassed the visual identity of the project and offering them free of charge to each person caught on camera, providing information about the possibilities for the student years to be the years of learning a sustainable way of life, promoting the video-message contest (October 1 – November 5, 2024) and the prizes prepared for the winners.

Results: approximately 400 people caught on camera, more than 500 flyers distributed to graduates, increased visibility of the project among the members of the academic community.

Conclusions: the mirror-type photo booth was a point of attraction, being the only place where the participants could get a reminder of their first day of studentship. We offered magnets together with the photos so that they could be placed in plain view (for example on the refrigerator door) and represent an incentive to respond favorably to other invitations from the project team.

3.2.1. Flyer design - front face

3.2.2. Photo handed to students

3.3. 103 for Poli

Date: 8 noiembrie 2023

Event details: sports event organized in partnership with Alergotura Association since 2015, during which, based on registrations, a number of laps of the stadium equal to Politehnica's age is run. In 2023 UPT celebrated 103 years since its foundation.

Target group: members of the UPT academic community, people concerned about a healthy lifestyle.

Main objectives: promoting the activities and social media pages of the project, encouraging sustainability through health care.

Participants: approximately 600 students and teachers.

Communication channels: face-to-face – through the two team members who led the 12th and 13th lap of the event, online – by encouraging participation in the sports event, messages on television sets installed in the dormitories, through the web page, which broadcast the invitation to „run for sustainability".

Activities: running two laps dedicated to the project, together with other supporters dressed in personalized T-shirts with the visual identity „I care", filming the tours with a drone, setting up a stand, promoting the competition between the dormitories and the disco dedicated to the students living on campus.

Results: 100 people ran in the personalized T-shirts, the entire academic community (1400 employees and hundreds of participating students) learned about the 2 „I care" laps, the contest between the dormitories and the LED DiscoTECH were promoted, the TeleUniversitatea channel broadcast images and statements with participants in „sustainability tours".

Conclusions: the event provided the occasion for the unconventional illustration of some ways of promoting sustainability within the institution. The academic community witnessed an example of project involvement and presence in all the festive moments over the year.

3.3.1. Vasile Gherheş – leader of lap 12

3.3.2. Erink Engh (Norvegia), Adina Palea, Lucia Teodor on the running track

3.4. Change a lighbulb! Choose an economical one!

Stage 1 – Career Days

Date: 18 October 2023

Event details: Career Days is the largest job fair organized by a university in Western Romania. More than 50 companies and more than 5000 young people looking for a job participate in each edition.

Target group: students and master's students of the Politehnica University Timisoara, young people looking for a job, companies and firms that want to receive students in practice, internship or hire.

Main objectives: organizing the first event in the „Change a light bulb" campaign. Choose an economical one!", promoting the project's activities and social media pages, promoting the video-message contest, encouraging involvement in the competition between UPT dormitories.

Participants: approximately 5000 students.

Communication channels: face-to-face – through Career Days volunteers.

Activities: by participating in the „treasure hunt", the students had the opportunity to receive a smart bulb with a light and motion sensor. At the same time, students were invited to adopt responsible consumption behaviors in the dormitories, in order to support the contest that would bring the title of „Champion of responsible consumption" to the winning dormitory.

Results: 300 young people received an economic light bulb, and 80 of them became followers of the project's social media pages.

Conclusions: the presence of the project at this event contributed to increasing notoriety, not only among students, but also among representatives of the economic environment. Moreover, it represented the starting point for the initiation of several additional partnerships within the project.

3.4.1. Opening of Career Days

3.4.2. Students scanning the QR code

Stage 2 –sampling event in the dormitories

Date: 2 November 2023

Event Details: The event aimed at distributing the remaining approximately 800 smart bulbs purchased through the project.

Target group: students staying in dormitories 19C, 20C, 21C and 22C, as well as any other applicants from neighboring dormitories.

Main objectives: to remove incandescent light bulbs from UPT dormitories, to inform students about the benefits of using LED light bulbs.

Participants: approximately 700 students and teachers.

Communication channels: messages on TVs installed in the dorms, messages sent via dorm committee groups, messages sent by administrators.

Activities: students present in the hallway of dormitory 21C could find out about the difference between the existing products on the market and could replace traditional light bulbs with „smart" ones. The major advantages of the offered sensor bulbs, in addition to saving electricity, are the easy installation and automatic operation.

Results: 700 students benefited from the light and motion sensor bulbs either directly, through personal pickup, or indirectly through dorm administrators installing such bulbs in common access areas; news about the activity was braodcast on TeleUniversitatea Timisoara.

Conclusions: the installation of sensor bulbs helped to reduce energy consumption and generated discussions among students on the usefulness of this type of „smart" bulb.

3.4.3. Distribution of light bulbs in dorm 21C

3.4.4. Mariana Cernicova explaining the usefulness of LED bulbs

3.5. LED DiscoTECH (Silent disco)

Date: 17 November 2023

Event details: LED DiscoTECH was an invitation to party in a multifunctional space, with an atmosphere created exclusively by LED light projections, where DJ Benito and MC Steliano conveyed the main messages of the „I Care" project on the rhythm of music.

Target group: students living in UPT dormitories, other students of Politehnica University Timisoara.

Main objectives: promoting the competition between dormitories and motivating students to get involved in reducing electricity, water and heat consumption; awarding the 10 winners of the video message contest.

Participants: about 500 students, including the winners of the video message contest.

Communication channels: posts and reels on Facebook and Instagram, announcement on the Student UPT app, poster displayed on television sets mounted at the entrance of dormitories, the invitation sent through the student associations.

Activities: the party took place in a multifunctional space (Architecture Club), located at the Faculty of Communication Sciences. Collaboration with a team of professionals in the entertainment industry ensured a pleasant atmosphere and qualitative music. During the event, there were messages promoting the project, as the logistics package also included a 2/4 m LED screen.

Results: we created an original event, in an atypical space, with memorable moments – lights off to be able to reflect on the needs of the planet and generate Instagrammable images created with the help of fluorescent bracelets distributed by the organizers. The party was broadcast on the project's Facebook page, via live streaming. We also generated a moment of awareness about noise pollution and the power consumption generated by the audio installation. We offered the prizes for the video message contest in a casual setting that combined the academic learning experience with age-specific fun. https://www.facebook.com/photo/?fbid=185138441317151&set=a.141736218990707

Conclusions: the partnership with the BRD increased the students' interest in the competition and additionally motivated them to participate in the award ceremony organized in the discotheque. The interaction between the students, occasioned by the party, reinforced the concern for the environment shown by some of them.

3.5.1 Design for advertising on TV sets

3.5.2. Participants at LED DiscoTECH

3.6. Sustainability skills for the workplace

Date: 10 April 2024

Event details: the Sustainability skills for the workplace seminar, held as part of the Career Days, XXIV edition, drew attention to the fact that new jobs require not only advanced professional knowledge and skills, but also a deep understanding of the society of the future.

Target group: UPT students, participants of the job fair.

Main objectives: understanding the concept of sustainability in the context of career development and practicing some skills needed in the society of the future.

Participants: approximately 60 students.

Communication channels: the Meta ecosystem and Google AdWords, announcement on the Student UPT app, the message broadcast on the televisions installed at the entrance to the dormitories.

Activities: hiring an experienced trainer to generate knowledge in the 2-hour seminar, team exercises, wrap-up session.

Results: 56 students present at the seminar, favorable feedback from them, over 41,000 accounts reached through dedicated Facebook posts, total reach of almost 400,000 people on the project's Facebook and Instagram pages, a 700% increase in visits on web page.

Conclusions: the intensive promotion of the event brought an increase in the visibility of the project and the Career Days job fair. Participating students stated that they would repeat the experience. The number of people who physically attended the event was, however, below the estimates based on the results of the online promotion campaign.

3.6.1. Design for TV sets

3.6.2. Teambuilding activities

3.7. Timisoara universities: education and action for sustainability

Date: 12 April 2024

Event details: the conference organized under the auspices of the Timisoara University Alliance brought together universities, public utility providers, local authorities and the economic environment with the aim of creating synergy between initiatives and strengthening the network of specialists concerned with sustainability.

Target group: representatives of local authorities, the four public universities members of ATU, public utility providers and the economic environment.

Main objectives: the exchange of ideas and best practices between local actors in order to identify common concerns and support efforts to implement the sustainable development objectives provided in the 2030 Agenda, stimulating synergy between projects to optimize the process of pursuing sustainable development objectives.

Participants: 8 institutions, students representing universities.

Communication channels: direct invitations sent to the management of the Timisoara City Hall, Timiș County Council, Timiș Chamber of Commerce, Industry and Agriculture, Aquatim, Retim, Timisoara state universities, posts on social networks, running a gif with the graphics of the event on the LED billboards in the city, press release, news on Teleuniversitatea TV.

Activities: presentations of the most important sustainability projects carried out by each of the participating institutions, 2 debate sessions, networking opportunities.

Results: awareness of the diversity of concerns in the field of sustainability, consistent exchange of ideas, identification of new partners for joint projects, approach to local actors.

Conclusions: the presentations were of high standard, the exchange of ideas contributed to broadening the horizons of all those present, the student interventions were useful and welcomed, the availability for cross-collaborations was expressed by all participants.

3.7.1. Design for LED billboards

3.7.2. speaker from USVT

3.7.3. Student representative

Online Campaign

3.8. Contest of students' videoproductions on social media accounts

Date: 1 October – 5 November 2023

Campaign Details: students were invited to share their thoughts on a „greener" future in a visual manner on social media channels. In the end, 45 valid video productions entered the evaluation according to the specifications mentioned in the contest regulations. Since most of the videos were uploaded to social platforms towards the end of the contest period, there was little time left to increase social media engagement.

Target group: all students of Politehnica University Timisoara

Main objectives: encouraging documentation on topics of interest for sustainability, with a role in awareness, perception and behavior change.

Participants: 49 video messages, of which 45 remained in the contest.

Communication channels: posts and reels on Facebook and Instagram, announcement on the Student UPT app, poster displayed on the televisions mounted at the entrance to the dormitories.

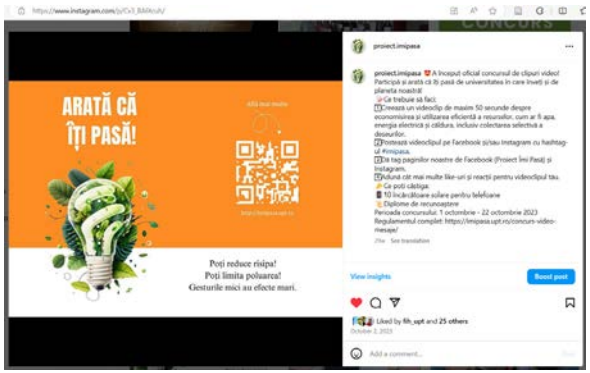
Activities: promoting the contest through mostly virtual messages, evaluating the materials uploaded on social networks, awarding the winners within the LED DiscoTECH. The evaluation was done in a participatory manner, the students being invited to establish a ranking of the best video productions. A team of professionals also evaluated the visual quality of the video messages produced, to award prizes not only based on the "popularity rating", but also through the filter of the suitability of the messages to the chosen broadcast channels.

Results: the qualitative analysis of the keywords used in the narrative of the videos shows a balanced approach to environmental problems, with students focusing on providing solutions after stating the problem. There were only two videos that ended in a humorous key, with all others adopting a neutral tone or exhibiting a slightly concerned attitude. The main preoccupation of students seems to be recycling.

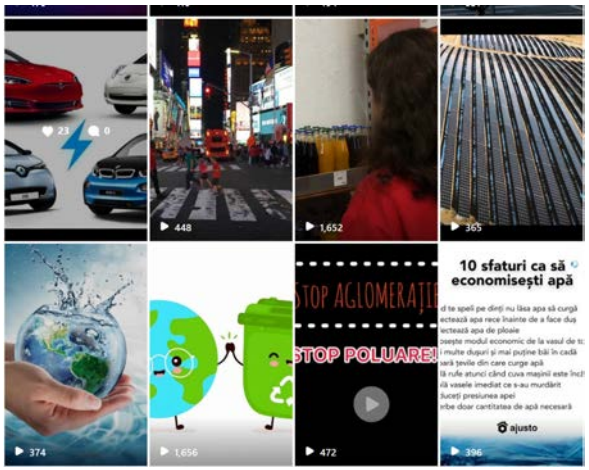
Conclusions: the coding of student-created messages results in the following categories: general consumption reduction (G), electricity saving (E), water saving (W), recycling (R), pollution (P) and other (O). The results are shown in the table below. The preferred platform was Instagram, where 43 of the 45 videos were posted, with Facebook being chosen by only two competitors. The videos attracted 24042 views and 1943 likes. Such messages or types of scenarios can serve as inspiration for further actions in the student community.

Table 3. Results of qualitative analysis of video messages

Environmental issue				**PPT dinamic**	**Stock videos***	**Original productions**
General reduction of consumption (G)	133	1829	4	2	1	1
Saving electric energy (E)	380	4535	11	7	3	1
Saving water (W)	305	3558	10	10		
Recycling (R)	882	10020	12	6	1	5
Fighting pollution (P)	104	1231	3	1	2	
Other (O)	139	2869	5	1	3	1



3.8.1. Example of Instagram post about the contest



3.8.2. Video clips created by students

3.8.3. Handing a prize

Integrated campaigns

Building a sustainable lifestyle and motivating students to adopt resource-saving behaviors were central objectives in the integrated communication campaigns conducted as part of the project. Knowing that behavior change is a long-term process and that it is based on repeated encounters with a certain type of information, we built long-lasting awareness campaigns, using all available online and offline communication channels. The existing infrastructure was used (application for mobile phones, UPosT electronic bulletin board, whatsapp groups, social media channels of the project and of the university), but also new communication channels were created, following the idea of reducing paper consumption, and thus 17 Smart TVs were bought and installed in dorm access areas. Their use over time demonstrated the need to purchase a remote-control system, to be able to customize the messages according to the specifics of the respective dormitory, according to the communication needs of the respective period.

3.9 „Dorm – champion of responsible consumption" contest

Date: 1 October – 31 December 2023

Campaign details: students of Politehnica University were invited to support the effort to create a „greener" campus, by practicing responsible consumption of energy, water and heat, more conscientiously selecting and collecting waste, as well as reducing the CO2 footprint in life and activities on campus.

Target group: 6000 students of the Politehnica University Timisoara who live in dormitories.

Main objectives: reduction of electricity, water and heat consumption; awareness of the impact of one's own behavior and undertaking a change.

Participants: students from the 14 dorms entered in the competition.

Communication channels: posts and reels on Facebook and Instagram, dedicated video clips, announcement on the website and on the Student UPT app, information messages played on the televisions installed at the entrance to the dormitories, WhatsApp groups of the dorm councils, own channels of the Social Department in UPT, mesh in the center of the university campus, stickers with recommendations to reduce waste posted in common spaces.

Activities: promoting the competition through a mix of channels and activities aimed at optimizing the impact of communication and mobilizing as many students as possible to get actively involved. The visual concept of the campaign was adapted for online posts as well as for ATL and BTL. We organized LED DiscoTECH as a

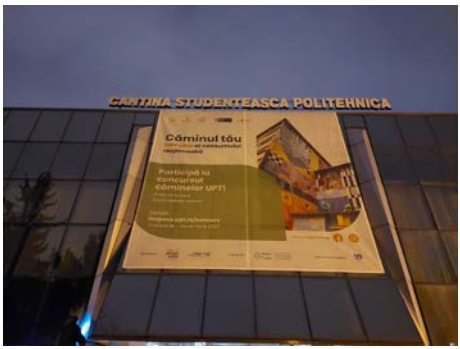
measure to promote the contest and stimulate participation. The award ceremony took place in several steps – results announced during the dissemination conference, press conference, voucher sampling event in the winning dormitory.

Results: there were consumption reductions, but with quite large variations from one dorm to another. Dormitory administrators were involved and made responsible for enhacing the reach of the message, the University Campus was covered with messages promoting the competition, additional partnerships were developed with Profi Rom Food SRL and Retim Ecologic Service SA.

The laureates were: 21C dormitory – for „responsible water consumption" category, 7C dormitory – for „responsible electricity consumption" category, 1 MV dormitory – for „responsible thermal energy consumption" category and 19C dormitory – champion of champions, for demonstrating responsible consumption in all three categories,

Conclusions: The campaign was visible both online and offline. Students encountered the messages of encouragement to reduce consumption in canteens, on buildings, at the entrance to dormitories, at meetings with administrators, on Facebook and Instagram accounts, etc. There is a considerable difference between what students declare that they are willing to do for the environment and what they actually choose to do, as can be seen in the next chapter.

3.9.1. Design of the campaign



3.9.2. Mesh on the canteen

3.9.3. Triptych in the university restaurant

3.9.4. Handing vouchers to residents of the winning dorm

3.9.5. Awarding the diploma to the winning dorm

3.10. EcoPoli spring cleaning event

Date: 16 April 2024

Campaign details: carrying out an action to green the Student Campus, in partnership with UPT Creative Campus and the Convention of Student Organizations in Politehnica.

Target group: students living on Student Campus in Timisoara.

Main objectives: cleaning the green spaces between the dormitories, awareness of the importance of each greening action.

Participants: 100 volunteers.

Communication channels: posts and reels on the Facebook and Instagram pages of the project and partners (COSPol, UPT Campus Creativ), giveaway campaign

in collaboration with a local influencer (Ana-Maria Popescu), announcement on the website EcoPoli transforms student energy into "green" action! – Îmi Pasă Universitatea Politehnica Timisoara (upt.ro) and on the Student UPT application, information messages broadcasted on the TV sets installed at the entrance to the dormitories, WhatsApp groups of the heads of dormitories, the own channels of the UPT Social Department.

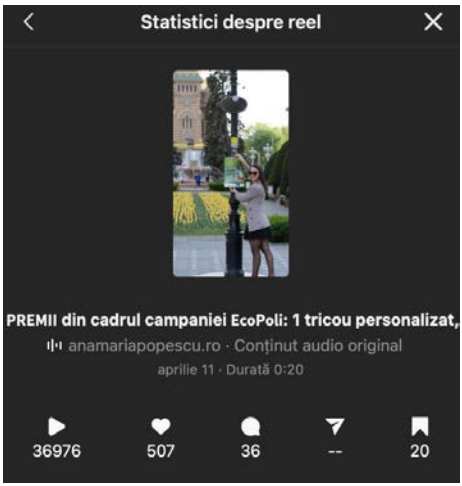
Activities: collecting waste from the Student Campus and painting „I care" logos on the sidewalks, at the entrance to each dormitory Proiect Îmi Pasă (USE-REC) (@proiect.imipasa) • Instagram photos and videos.

Results: it was found that there is not much waste left unattended in the spaces around the dormitories, the only generalized problem being cigarette butts. The volunteers got involved and had fun helping to improve the surrounding area. The online impact was very good, the campaign generating a very good online presence of the greening messages, with a total reach of over 400,000 unique accounts. The guerilla marketing initiative was very successful, with the placement of the "I care" logo on the alleys of the Student Campus. The students had a framework in which to channel their desire to contribute to the greening of the campus, combining volunteering with spending free time in a fun manner.

Conclusions: the campaign was received with enthusiasm, enjoyed the support of all those involved and it is desired to be taken over by the university management and turned into a traditional event.

3.10.1. Design of EcoPoli campaign

3.10.2 Reel reach



3.10.3 Reach of influencer campaign

3.10.4. The „I care" logo on the pavement

3.10.5. Students at the EcoPoli stand

3.10.6. Students on campus

Project communication, in service of sustainability

Dissemination of results to the national and international scientific community was a constant preoccupation for the project team, exceeding the objectives assumed by the project team. Being aware of the usefulness of the research and of the importance of disseminating good practices, the project team achieved the following visible results:

(a) Conferences

Mariana Cernicova-Buca, Gabriel-Mugurel Dragomir, Vasile Gherhes, Adina Palea, „Involving students in co-creating the future of campus life in Timisoara",

within the international conference Reimagining the city from my window, 13 October 2023, organized by Politehnica University Timisoara and Høgskulen for grøn utvikling (HGUt, Norway), Romanian-Norwegian collaboration in the Politechnica University – new pages in a rich album – Îmi Pasă Universitatea Politehnica Timisoara (upt.ro)

Mariana Cernicova-Buca, Vasile Gherheș, Adina Palea, Gabriel-Mugurel Dragomir, „Students as co-creators of an environment-friendly campus in Timisoara", presented on 4 March 2024 within the *18th annual International Technology, Education and Development Conference* (INTED 2024) organized in Valencia (Spain) on the 4th– 6th March 2024, USE-REC experience shared at a major educational conference in Valencia (Spain) – Îmi Pasă Universitatea Politehnica Timisoara (upt.ro)

(b) Workshops

Mariana Cernicova-Buca, Gabriel-Mugurel Dragomir, Vasile Gherhes, Adina Palea, „Empowering young adults as futures sustainable citizens", paper presented in the international workshop Empowering Young People as Culture Providers, 16 October 2023, organized by Politehnica University Timisoara and Høgskulen for grøn utvikling (HGUt, Norway), https://www.facebook.com/reel/877416566781339

„Technology and society: sustainability challenges" workshop, moderated by Adina Palea within TIMA23 international conference on "Innovative Technologies for Joining Advanced Materials", International workshop on sustainability and societal needs – Îmi Pasă Universitatea Politehnica Timisoara (upt.ro)

Round table „Communicating science" organized by the Department of Communication and Foreign Languages (UPT), on 15 November 2023, USE-REC project brough to the attention of the academic community of Politehnica Universit – Îmi Pasă Universitatea Politehnica Timisoara (upt.ro)

(c) Scientific articles

Cernicova-Buca, Mariana, Gabriel-Mugurel Dragomir, Vasile Gherheș, and Adina Palea. 2023. „Students' Awareness Regarding Environment Protection in Campus Life: Evidence from Romania" *Sustainability* 15, no. 23: 16444. https://doi.org/10.3390/su152316444

Cernicova-Buca, Mariana, Vasile Gherheș, Gabriel-Mugurel Dragomir, and Roxana-Mihaela Sirbu. 2024. „Electrically Savvy or Not? Tentative Portrait of the Romanian Student as a Consumer of Electric Devices and Utilities" *Sustainability* 16, no. 3: 1239. https://doi.org/10.3390/su16031239

(d) E-book

Vasile Gherheș (coord.), *Communicating sustainability. Diagnosis, intervention, and transformative experiences on a student campus,* Tritonic, 2024.

Communication channels used throughout the project

Web page

Îmi Pasă Universitatea Politehnica Timisoara (upt.ro)
https://imipasa.upt.ro

Facebook page

https://www.facebook.com/imipasa.upt

Instagram page

https://www.instagram.com/proiect.imipasa/

Hashtags

#imipasa #proiect #sustenabilitate #viitorverde #creativitate #viatadestudent #UPT #campus #constientizare #EcoPoli #NorwayGrants

Student electronic bulletin board – UPosT

https://upost.upt.ro/2024/04/25/iubesc-planeta-imi-pasa-de-resurse/

Mobile phone app – Student UPT

https://apps.apple.com/us/app/student-upt/id1278676023

Smart television sets

Smart TV in dorm 21C

Smart TV in dorm 4C

Youtube channel

https://www.youtube.com/@PolicomUPT

Press releases

13–07-2023-consum-responsabil-si-sustenabil.pdf (upt.ro)
06–03-2024-upt-a-premiat-caminele.pdf
4–04-2024-Rezultate-ale-preocuparilor-la-Politehnica-Timisoara-pentru-consumul-responsabil-si-sustenabil-de-energie 1.pdf (upt.ro)
12–04-2024-Dezbatere-privind-educatia-pentru-sustenabilitate-sub-egida-ATU.pdf (upt.ro)

TV shows

https://www.facebook.com/TVRTimisoara/videos/639124238391268
https://www.facebook.com/TeleU.Timisoara/videos/1119516699241206
TeleU: „Raport săptămânal" – YouTube

6. A TRANSFORMATIVE EXPERIENCE: ATTITUDINAL CHANGES FOLLOWING THE INTERVENTION

Gabriel-Mugurel Dragomir

Information and awareness campaigns were conducted to promote responsible and sustainable energy consumption regarding electricity consumption, water consumption, thermal energy (heating) consumption and selective waste collection. At the end of the project, the project team registered detectable changes in the sense intended by the campaigns in only three directions. We present further only the data for these significant changes, in a comparative way, before the start of the project (initial phase) and after the completion of the project (final phase), expressed in average numbers for the evaluated sample of students.

ELECTRICITY CONSUMPTION

The project team asked the respondents to select for each of the statements below, an answer variant that describes best their behavior regarding electricity consumption.

Table 1. Results of mean values for usual behaviors related to electricity consumption, before and after information and awareness campaigns

Habitual behaviors related to electricity consumption	Initial (mean)	Final (mean)
1. I turn off the light when I leave the room	4.55	4.61
2.I turn off the light when I watch TV	4.12	4.16
3. I replace classic bulbs with ones that have low energy consumption	3.95	3.73
4. I air dry clothes, not using the automatic dryer	4.21	4.11

Habitual behaviors related to electricity consumption	Initial (mean)	Final (mean)
5. I unplug electrical and electronic appliances that I do not use them (they consume energy even if they are off)	3.27	3.48
6. I leave the TV on even if I'm not watching it	2.83	2.85
7. I open the blinds and let as much natural light into the house as possible	4.43	4.46
8. I set the air conditioner to a temperature no more than 10 degrees lower than the temperature outside during summer season	2.66	3.28
9. I set the temperature to 20–22° C in the cold season, and if it seems cold, I put on an article of clothing with long sleeves	3.54	3.68
10.In winter, if it is too hot in the room, I adjust the temperature using the radiator tap	3.19	3.44
11. I check the number of lifetime hours on the light bulb boxes before buying them	2.38	2.55
12. I choose to buy household appliances that have low energy consumption	3.35	3.35
13. I put my mobile phone on power saving mode, so it doesn't need often charging	3.08	3.28

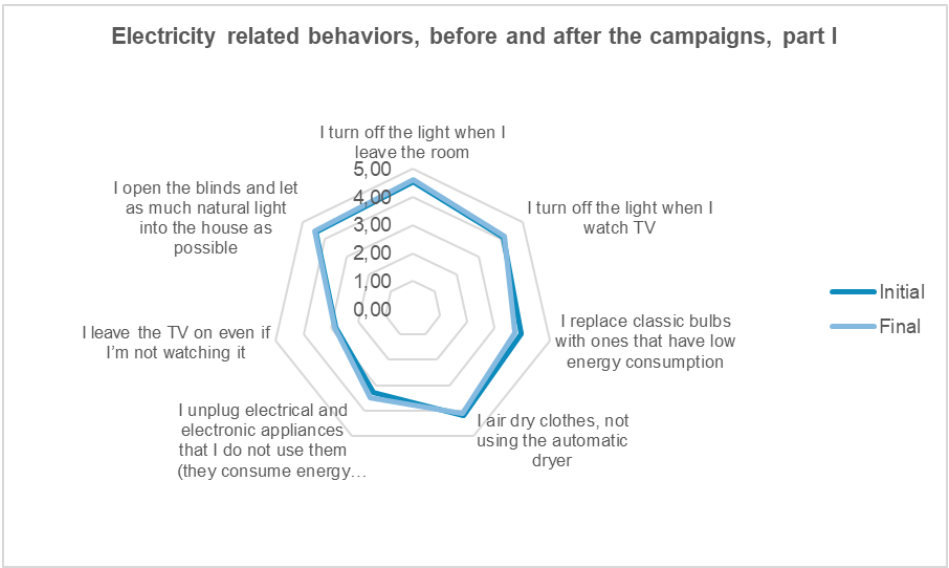


Figure 1. Common behaviors related to electricity consumption, Part I

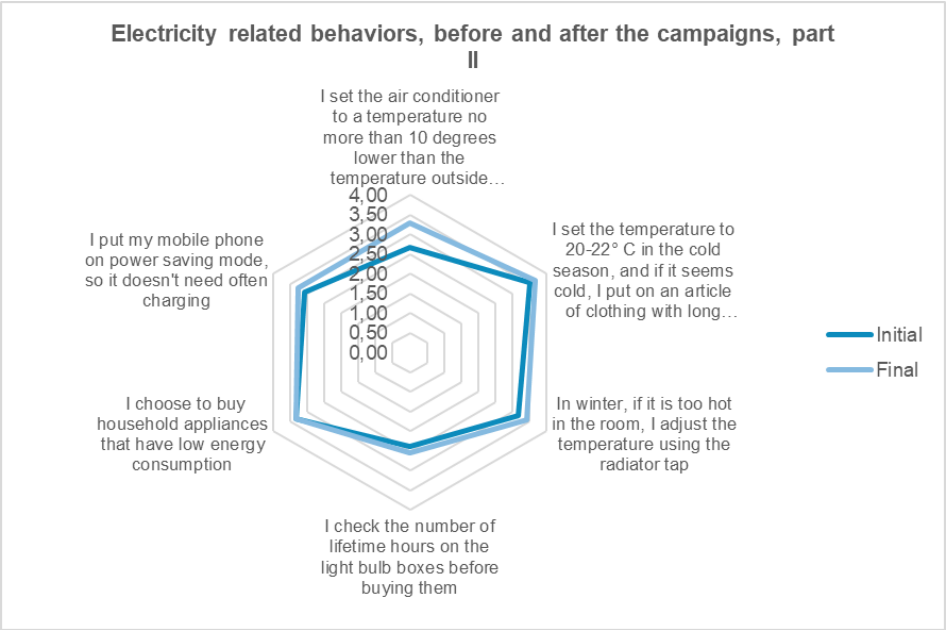


Figure 2. Common behaviors related to electricity consumption, Part II

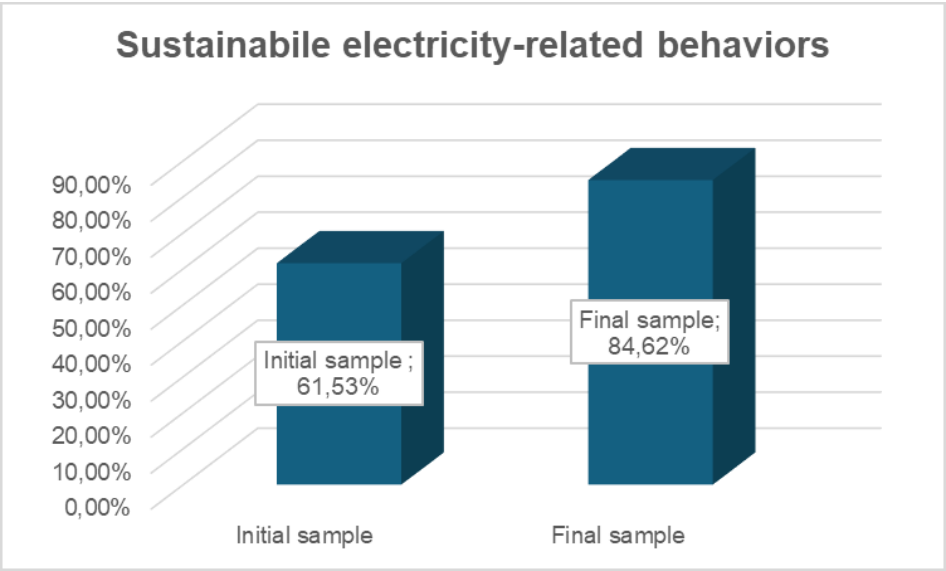


Figure 3 Comparison between samples in electricity consumption

The analysis of different behaviors regarding sustainable electricity consumption revealed significant differences between the beginning of the campaigns and the end of the campaigns conducted throughout the project. The recorded difference was 23.08% in the direction of increasing the occurrence of sustainable behaviors related to electricity consumption.

Significantly changed behaviors in a sustainable sense

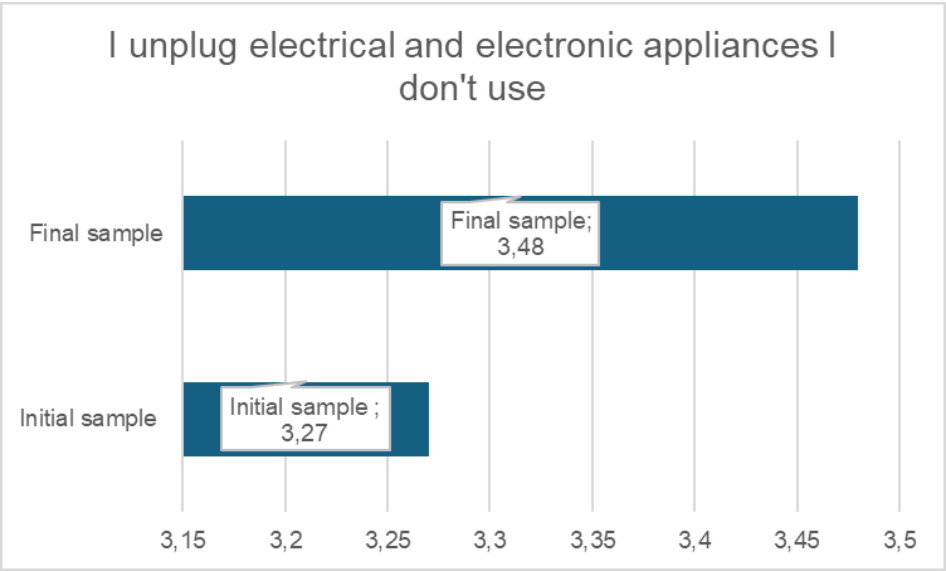


Figure 4. Sustainable behavior leading to unplugging electrical appliances and electronics they do not use.

The analysis of different behaviors in terms of sustainable electricity consumption revealed significant differences between the beginning of the campaigns and the end of the campaigns conducted through the project (Initial mean = 3.27, Final mean = 3.48), in terms *of unplugging electrical and electronic appliances* ($t = -3.31$, $p = 0.01$).

Unmodified behaviors

The behavior of checking the number of hours of lighting on bulb boxes before buying them has not changed much (despite information and awareness campaigns) (Initial mean = 2.38, Final mean = 2.55).

WATER CONSUMPTION

Respondents were asked to select for each of the statements below, an answer variant that best describes their water-related behavior.

Table 2. Results of mean values for habitual behaviors related to water consumption, before and after information and awareness campaigns

Habitual behaviors related to water consumption	Initial (mean)	Final (mean)
1.I turn the water on to the maximum when washing dishes or food.	2.32	2.29
2.I let the water run while I brush my teeth.	2.74	2.85
3. I fix the sink faucet if it drips	4.15	4.03
4. I watch the time I spend in the shower every day so that I fit in 5, maximum 10 minutes	2.43	3.35
5. I use washing machine programs at low temperatures (maximum 40 degrees Celsius)	3.65	3.86
6. I don't start the washing machine or dishes for a few items/clothes, I wait until it can be fully loaded	3.99	4.15
7. I let the shower run while I apply soap on myself	2.84	2.88
8. I turn on the faucets a few minutes before showering	2.42	2.44
9. I report if I notice any plumbing/water leaks	4.35	4.49

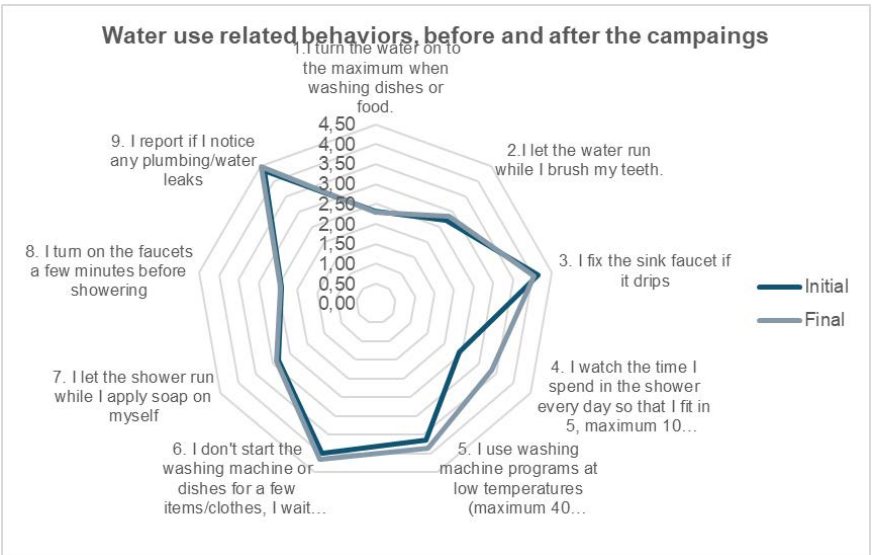


Figure 5. Common water-related behaviors

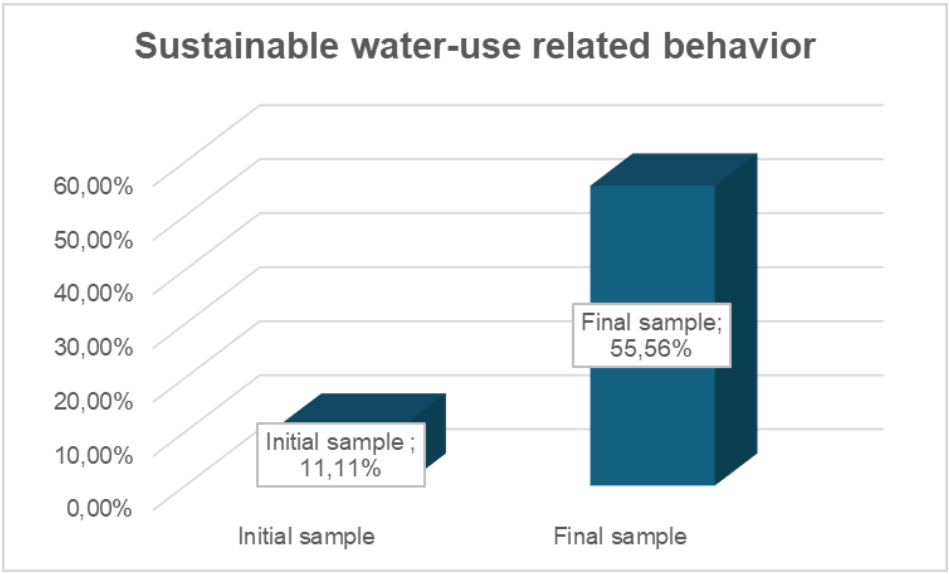


Figure 6. Comparison of student samples related to water consumption.

The difference is 44.44% in terms of increasing the sustainable behaviors, leading to a sustainable water consumption.

The analysis of different behaviors in terms of sustainable water consumption revealed significant differences between the beginning of the campaigns and the end of the campaigns carried out through the project at the following parameters:

- Minding the time spent daily in the shower so that it falls between 5 and 10 minutes (Initial mean = 2.43, Final mean = 3.435; t = -13.371, p = 0.001).
- Use of washing programs at a low temperature (maximum 40 degrees Celsius) (Initial mean = 3.65, Final mean = 3.86; t = -3.6, p = 0.001).
- Waiting for the washing machine or dishwasher to be fully loaded and then used (Initial mean = 3.99, Final mean = 4.15; t = -3.6, p = 0.001).
- Notify administrators if they notice plumbing failures/water leaks (Initial mean = 4.35, Final mean = 4.49; t = 4.35, p = 0.001).

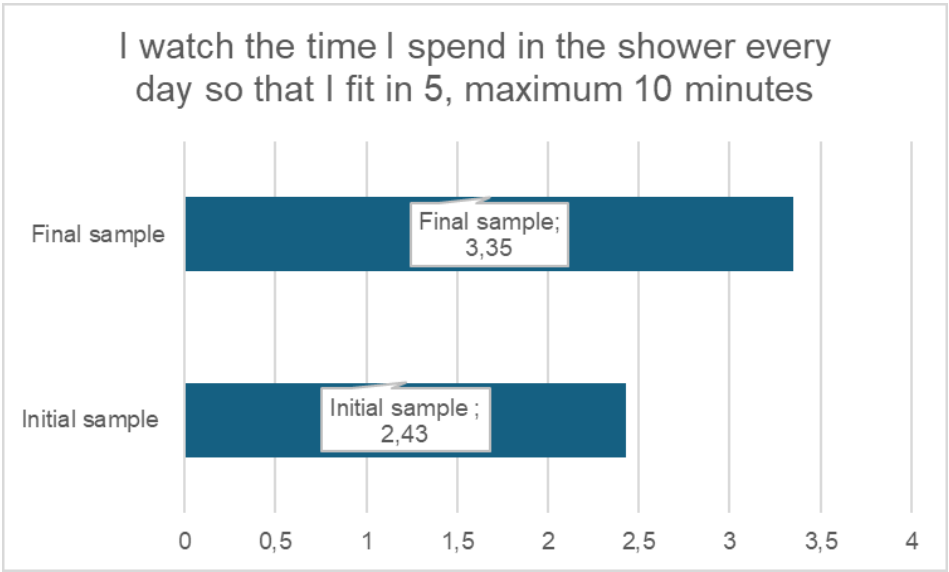


Figure 7. Sustainable behavior of counting time spent daily in the shower.

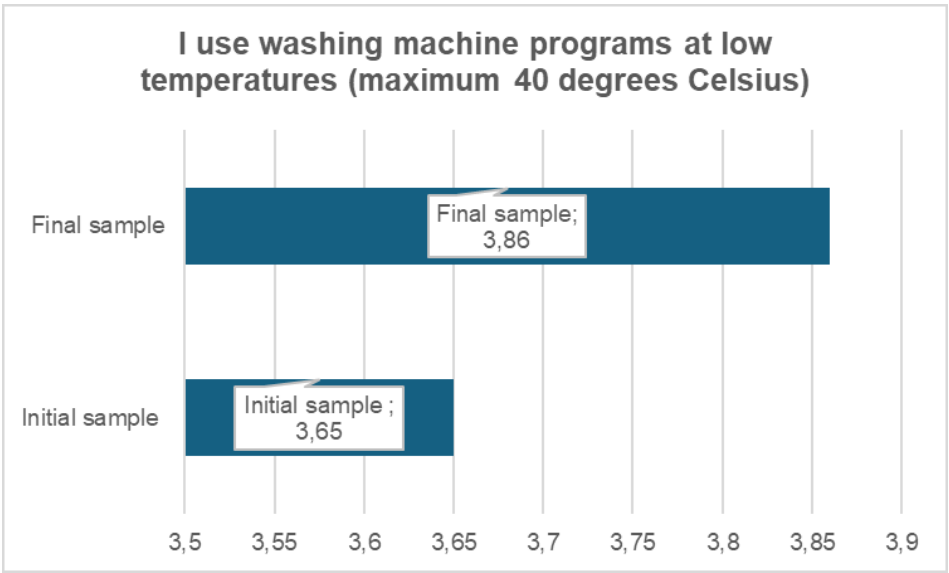


Figure 8. Sustainable behavior of using washing programs at a low temperature (maximum 40 degrees)

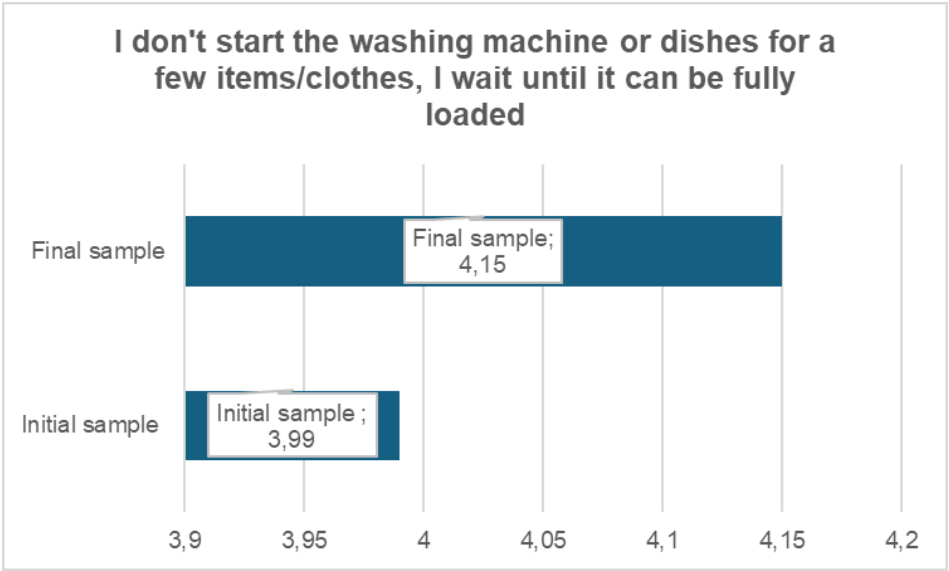


Figure 9. Sustainable behavior resulting in waiting for the washing machine or dishwasher to be fully loaded and then used.

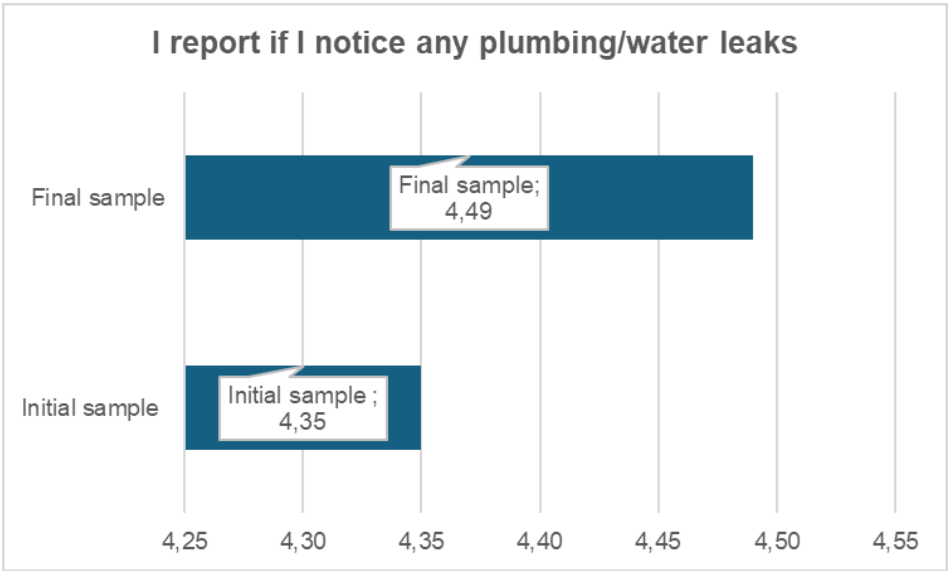


Figure 10. Sustainable behavior by showing interest in the proper functioning of plumbing.

Unmodified behaviors

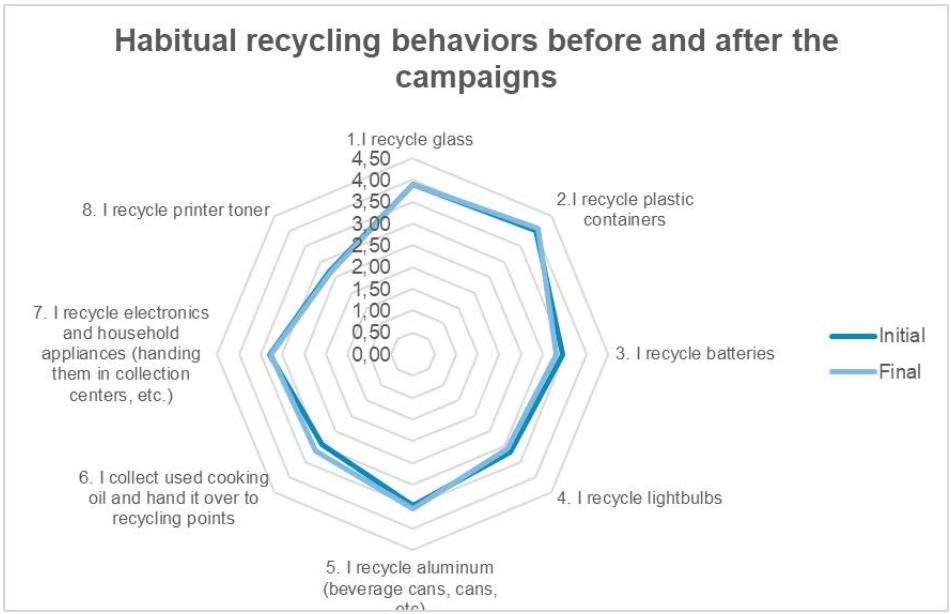
When it comes to water consumption, we also observed some behaviors that have not changed in a sustainable sense but have remained approximately unchanged.

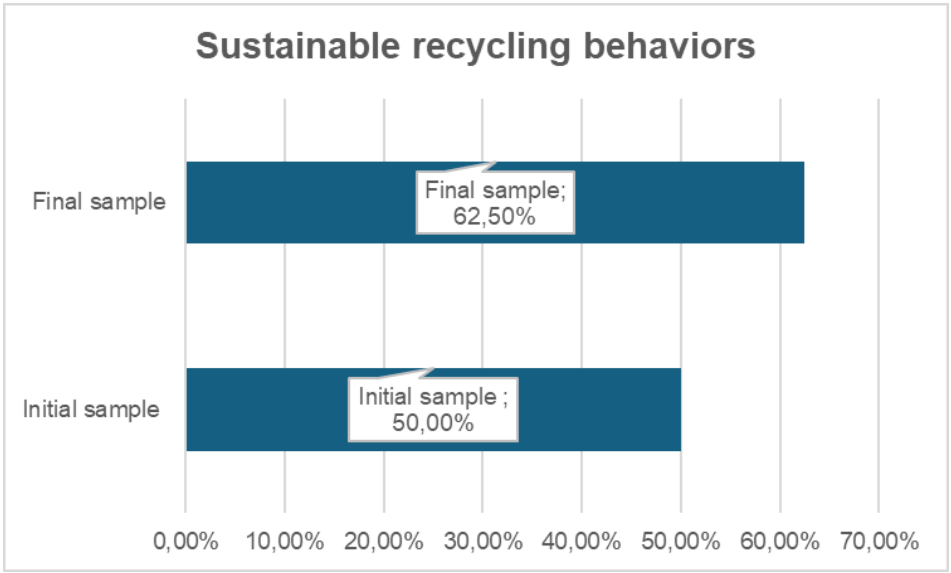
- Use of taps in the maximum flow position when washing dishes or food (Initial mean = 2.38, Final mean = 2.55).
- Opening the taps a few minutes before taking the shower (Initial mean = 2.42; Final mean = 2.44).

RECYCLING BEHAVIOUR

The project team asked the respondents to select, for each of the statements below, an answer variant that best describes their behavior towards recycling.

Recycling-related behaviors	Initial (mean)	Final (mean)
1.I recycle glass	3.91	3.91
2.I recycle plastic containers	4.01	4.09
3. I recycle batteries	3.45	3.31
4. I recycle lightbulbs	3.19	3.07
5. I recycle aluminum (beverage cans, cans, etc)	3.49	3.56
6. I collect used cooking oil and hand it over to recycling points	2.94	3.14
7. I recycle electronics and household appliances (handing them in collection centers, etc.)	3.28	3.27
8. I recycle printer toner	2.71	2.67



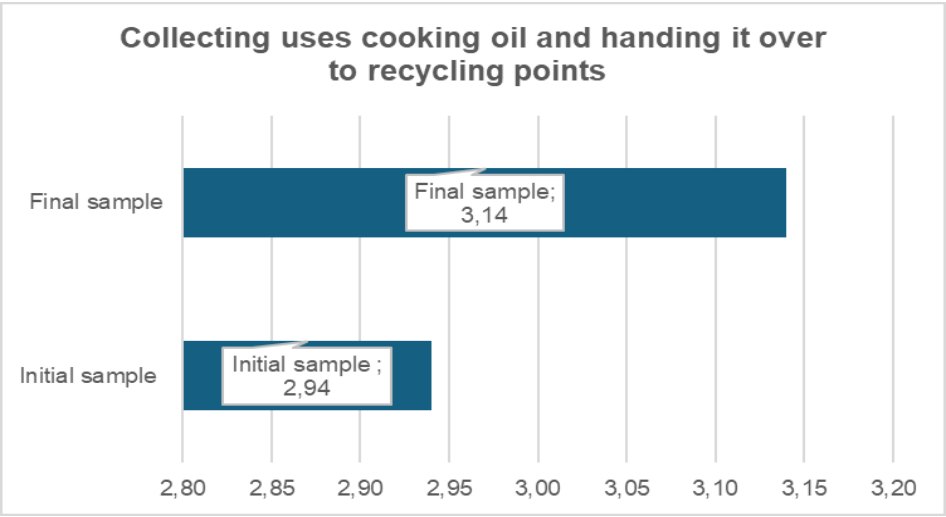


The difference between the beginning and the end of the project is 12.5%, in the sense of increasing sustainable recycling behavior due to the project.

Statistically significant change of behaviors in recycling, leading to sustainability

The analysis of different behaviors in terms of sustainable recycling behavior revealed significant differences between the phases before and after the campaigns conducted through the project in the following parameter:

- Collection of used food oil and its delivery to recycling points (Initial mean = 2.94, Final mean = 3.14; t = -2.638, p = 0.08).



To sum up, the comparative analysis of the self-assessed student behaviors before the start of the project and at the final stage, after the implemented campaigns, indicate that change occurred, but unevenly. The main habitual actions (as measurable signs of the shift towards sustainability) are the following:

- Unplugging electrical and electronic appliances.
- Counting the time spent daily in the shower so that it falls between 5 and 10 minutes.
- Use of washing programs at a low temperature (maximum 40 degrees).
- Waiting for the washing machine or dishwasher to be fully loaded and then used.
- Informing administrators about plumbing failures / water leaks.
- Collection of used food oil and its delivery to recycling points.

The information and awareness-raising campaign conducted over three months proved to be successful, in terms of expected (and obtained) effects. This encourages both the project team and the university management to conduct such campaigns in the future, in accordance with environmental policies at national level, but also with the strategic directives of the Politehnica University Timisoara.

7. THE "FOOTPRINT" OF THE PROJECT – CONCLUSIONS AND PERSPECTIVES

Vasile Gherheș, Mariana Cernicova-Bucă,
Gabriel-Mugurel Dragomir, Adina Palea

Gro Harlem Brundtland, former Prime Minister of Norway, in her later capacity as Chair of the **World Commission on Environment and Development**, defined sustainability in 1987 as being "the development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (Brundtland, 1987). Nearly four decades later, the concept of sustainability has evolved and from rarely being present in public discourse it grew to being an extremely consistent topic of concern. There is little time left until 2030, the target set by the United Nations for meeting the Sustainable Development Goals. The pace of fulfilling the obligations assumed by states, companies and other major social operators does not encourage a too optimistic prognosis regarding the possibility of meeting the ambitious goals (Agenda 2030). However, the responsibility for sparing the planet's resources does not lie only with the big players on the international arena: studies show that the carbon footprint generated by human activity is up to 60–70% due to individual consumption decisions. Even if concrete numbers are challenged, and even with the skeptical trend in current public opinion, according to which the climate will change and the planet will reach its own equilibrium no matter what individuals are committed to undertaking (van der Linden, 2015; Wang and Kim, 2018; Marshall et al., 2019), the Paris Agreement (to which Romania is a signatory part) on climate change takes into account individual households as contributors that need to act in order to curve global warming below the threshold of 1.5°C (Agreement, 2015). The signatory states also committed to pushing the target of zero emissions in the plans of all signatory parties, as well as to implement a mechanism through which states accelerate the decarbonization process every five years. The "zero emissions" target has become extremely visible, at least in Europe, and the implementation of solutions to achieve this target is assumed not only by industries or countries, but also by numerous universities of the world (Progress,

n.d.; Sen, 2022). Moreover, universities are committed to being at the forefront of the transition towards a more sustainable world, as they also pursue this goal by educating new generations in such a spirit, and through their current operations, by taking measures to reduce their own carbon footprint (Kaur and Kaur, 2022; Sen et al., 2022; Žalėnienė and Pereira, 2021; Valls-Val and Bovea, 2021; Badea et al., 2020; Rodriguez-Andara et. al., 2020; Azeitero and Davim, 2019; Santovito and Abiko, 2018).

The project described in this volume is part of the interventions that teams from different universities around the world have adopted to accelerate transition processes towards a more sustainable campus (Sharp, 2009; Lozano et al., 2013; Martins et al., 2021; Sugiarto et al., 2022; Bui et al., 2023; Alvarenga et al., 2024). The approach follows the "research-action" model, the research component being the basis of activities adapted to the specificity, conditions, and institutional context of the Politehnica University Timișoara (Cernicova et al., 2024; Kemmis 2010; Greenwood and Levin, 2007). Another essential feature of the project was the participatory approach, the university stakeholders being involved in identifying the problems to be solved, in developing and implementing the formulated solutions, as seen in the chapters dedicated to describing the project implementation phases (Trencher et al., 2016; Rundle-Thiele et al., 2021; Cernicova-Bucă et al., 2024). Finally, since universities are 'learning institutions', each project, each experience leads to the enrichment of the portfolio of resources on which HEIs base their strategic plans (Sharp, 2002). This volume capitalizes on these experiences and offers them, as models of good practice, for debate and/or inspiration, to other universities that implement or want to implement sustainability principles on their campuses.

To sum up, the project team appreciates that each of the university stakeholders played a significant role, conducted specific actions, and went through a process at the end of which they were subjected to direct effects, as seen in the table below:

Table 1. Role and activities of stakeholders in light of the effects of the USE-REC project

Stakeholders	Role	Activity	Effect
Students residing on campus	Beneficiary	Adoption and implementation of pro-environmental behaviors	Practice and reinforce sustainable behaviors.
Dorm administrators	Support	Monitoring consumption and providing information about the data	Awareness of their role in the organization; sense of work value

Stakeholders	Role	Activity	Effect
UPT Management	Coordinator	Ensuring the normative framework and accommodation conditions in dormitories	Concrete manifestation of concerns for sustainability policies at campus level
Project team	Facilitator	Transformative intervention (initiation and piloting of actions)	Gaining experience in mobilizing the academic community for active engagement in support of green initiatives

Encouraging behavior change toward a (more) sustainable variant is one of the most pressing challenges for public policy, as highlighted by many researchers (Lohman et al., 2024; Rundle-Thiele et al., 2021; Azeitero and Davim, 2019; Thaler and Sunstein, 2008). The quasi-unanimous problem is that behavioral changes take place under the influence of certain stimuli, not necessarily financial, but over time the reaction to stimuli "wears out", habituation occurs and even falling into old behavioral paths (Thaler and Sunstein, 2008; Lohman et al., 2024). A single behavior change campaign, even a successful one, must be resumed, with updates and adaptations, so that the process of reinforcing messages and reinforcing behaviors is not interrupted (Rundle-Thiele et al., 2021). Stakeholder participation in institutional development cannot be regarded as a static element (Snow et al., 1986). Project activities and information-awareness campaigns take place in a dynamic environment, in given contexts, which enhance or inhibit the mobilization capacity of the target audience. In implementing the USE-REC project, the team considered the academic calendar, institutional flagship events, messages in favor of sustainable behaviors coming from the media, the rhythms of student life and students' information-documentation habits and channels. The organization of activities in online, offline, or mixed formats was also calibrated according to a complex of factors specific to the academic community. The project team took measures to avoid cultivating so-called "clicktivism" (Wojtowicz et al., 2024) – i.e., an automatic and non-committal reaction of students to online posts on project objectives and activities. The campaigns included extensive components in which students were invited to effectively engage either with their own posts and video productions, or with participation in trainings (proposed webinars, summer schools or trainings), or face-to-face activities and events. The approach alternated persuasion techniques based on reasoning and scientific demonstration with emotion-based communication strategies that value sustainability-oriented

behavior and stimulate pride as an "eco-citizen student", without stigmatizing groups that do not embrace (yet) such models. The ethical component guided the careful formulation of messages so that they did not slide into propaganda or segregation of student groups. Rather, in today's academic environment, a constructivist approach to supporting students' education to define a personal and professional identity as sustainable individuals is, in the opinion of the project team, a consolidated, verified solution leading to success. The student years are for young people engaged in tertiary education, the years of vocational training, but also the years of preparation for autonomous life as adults. Universities, in their modern sense, assume the role of providing education, but also experiences that validate beliefs, values (personal and professional), young people's concepts about their own life and about their role in society. Life in student dormitories especially facilitates accommodation with a modern lifestyle and the anticipation of autonomy. In campus life, students sometimes encounter realities that were a rarity or completely missed from their prior experience. That is the reason for which university support, offered both through procedural channels and through informal support systems, plays a significant role in the becoming of the younger generation (Barnett, 2010). Social development is impossible to achieve without a globally shared, interdisciplinary values-based education that encourages critical thinking and readiness for lifelong learning. If social development can be both a coordinated-directed process (through the development of social programs at macro level) and a diffuse one (resulting, for example, as an effect of technical-scientific progress) (Zamfir and Stoica, 2006), community development through projects is strictly a process based on the effort and voluntary support of community members, in our case, of the academic community of the Politehnica University Timisoara, aimed at increasing social capital and optimizing the way of interacting with the new generations of young people who knock at the gates of recognition as professionals. The described project is, we believe, an example of local intervention that considers global trends in higher education, sustainability, and an optimistic vision of the transformative power of education.

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