

Green Campus, Smart Future

A Practical Guide
for Sustainable Higher Education



Co-funded by the
Erasmus+ Programme
of the European Union

HEI GreenPath

*Shaping HEI environment for
a sustainable tomorrow*



Project Coordinator



University College of Enterprise and Administration in Lublin (WSPA), Poland - wsa.pl

Partner Institutions



Agricultural University of Athens (AUA), Greece - aua.gr



Frederick University (FredU), Cyprus - frederick.ac.cy



International School for Business and Social Studies (ISSBS), Slovenia - mfdps.si



MED.E.A. University for Mediterranean, Europe and Africa

MED.E.A - Pegaso International Higher Education Institution, Malta - unimedea.eu

This project is co-funded with the support from the European Union (project no 2024-1-PL01-KA220-HED-000244946). The materials developed as part of the project are views only of their authors, which do not necessarily reflect the views of the European Commission and the Foundation for the Development of the Education System (National Agency). The European Commission and FRSE are not responsible for the content of the materials developed as part of the project

Green Campus, Smart Future: A Practical Guide for Sustainable Higher Education

Erasmus+ KA220 - HED Project



2026



Co-funded by the
Erasmus+ Programme
of the European Union



Brochure Title: Green Campus, Smart Future: A Practical Guide for Sustainable Higher Education

Project Title: HEI GreenPath: Shaping HEI environment for a sustainable tomorrow

Project Acronym: HEI GreenPath

Project Reference Number: 2024-1-PL01-KA220-HED-000244946

Editor: mag. Anica Novak Trunk

Authors by chapters:

Chapter 1: Prof. Dr. Valerij Dermol¹; Assoc. Prof. Dr. Aleš Trunk²; Mag. Anica Novak³

Chapter 2: Dr. Ewelina Widelska⁴

Chapter 3: Dr Vasiliki Tsagkou⁵; Prof. Iordanis Chatzipavlidis⁶

Chapter 4: M.A. Antria Karaoli⁷, Assoc. Prof. Dr. Petroula Mavrikiou⁸

Chapter 5: Assoc. Prof. Dr. Michele Corleto⁹, PhD Candidate Alessia Sciamanna¹⁰

Chapter 6: Collective contribution of all brochure authors

¹ International School for Social and Business Studies, and DERMOL doo Slovenia, valerij.dermol@mfdps.si

² International School for Social and Business Studies, Slovenia, ales.trunk@mfdps.si

³ International School for Social and Business Studies, Slovenia, anicanovak@mfdps.si

⁴ University College of Enterprise and Administration in Lublin, Poland, e.wid@wp.pl; e.widelska@wspa.pl

⁵ Lab. of General and Agricultural Microbiology, Department of Crop Science, Agricultural University of Athens, Greece – tsagouv@aua.gr

⁶ Lab. of General and Agricultural Microbiology, Department of Crop Science, Agricultural University of Athens, Greece - chatzipavlidis@aua.gr

⁷ Gender Equality and Inclusion Research Unit (RIGE), Frederick University, Cyprus - res.ak@frederick.ac.cy

⁸ Department of Business Administration; Gender Equality and Inclusion Research Unit (RIGE), Frederick University, Cyprus -p.mavrikiou@frederick.ac.cy

⁹ Pegaso Online University, MED.E.A. - Pegaso International - michele.corleto@unipegaso.it

¹⁰ Pegaso Online University, MED.E.A. - Pegaso International - alessia.sciamanna@unipegaso.it

Table of Contents

Introduction	7
1 Green Campus and Sustainable Living	9
1.1 Introduction	9
1.2 Infrastructure for Sustainable Campuses	11
1.3 People: engaging campus communities for sustainable living	14
1.4 Key performance indicators – ideas	17
1.5 Selected good practices	18
1.6 Quick wins	20
1.7 Reference list	21
2 Smart Energy and Digital Efficiency	22
2.1 Automation and Intelligent Management Solutions (BMS)	22
2.2 Human-centric perspective — why technology matters for people	24
2.3 HVAC Solutions (Heating, Ventilation, Air Conditioning)	26
2.4 Energy-Efficient Lighting	27
2.5 Energy Production and Storage (RES)	29
2.6 Resource Management and Materials	31
2.7 Quick wins	34
2.8 Reference list	35
3 Circular Resources: Waste, Water, and Materials	36
3.1 Introduction	36
3.2 Infrastructure	36
3.3 People and behaviour change	39
3.4 Implementation Tools and Monitoring	41
3.5 Case Studies	43
3.6 Conclusions	45
3.7 Quick wins	45
3.8 Reference list	45
4 Smart Mobility and Sustainable Travel	46
4.1 Developing a Smart and Sustainable Mobility System in a University Campus	46
4.2 Smart Mobility in Motion: Best Practices in Higher Education	50
4.3 A Greener Journey: Emissions Reduction Potential	54
4.4 Learning from Real-World Experience	55
4.5 Key Takeaways	55
4.6 Quick wins	56
4.7 Reference List	56

5	Governance, Engagement, and the Sustainability Roadmap	57
5.1	Introduction: Sustainability as a Shared Ethical Vocation	57
5.2	Strategic Infrastructure: The Distributed Leadership of The Three-Tier Governance Model	58
5.3	People & Engagement: From Participation to Co-creation	63
5.4	The Sustainability path: A story of continuous improvement	65
5.5	Education & external Partnerships: The Open Campus	70
5.6	Conclusion: Leading by Example	71
5.7	Selected Good Practices	71
5.8	Quick wins	73
5.9	Reference list	74
6	Green Campus checklist	75

Introduction

Growing environmental challenges, such as climate change, resource depletion, and environmental degradation, have prompted higher education institutions to play a more active role in sustainable innovation, education, and responsible campus development. Universities provide unique environments where sustainable ideas and practices can be explored, applied, and continuously improved through the integration of education, research, daily life, and community engagement. As “living laboratories,” they offer opportunities to test and experience sustainable solutions in practice while helping to shape environmental awareness, values, and behaviours among students, staff, and future professionals.

A green campus embodies a sustained commitment to sustainability, integrating community engagement, education, infrastructure, and institutional accountability. It creates healthier, more inclusive, and environmentally responsible spaces for studying, working, and daily campus life, extending beyond energy-efficient buildings and technological innovations. Sustainable campus initiatives can reduce environmental impacts, lower operational costs, enhance biodiversity, improve wellbeing, and strengthen environmental awareness. At the same time, universities often face challenges related to funding, organisational complexity, and the integration of sustainability across diverse academic, administrative, and operational areas.

This brochure, ***Green Campus, Smart Future: A Practical Guide for Sustainable Higher Education***, was created to support universities in developing greener, smarter, and more sustainable campuses. It provides practical recommendations, tools, and examples to help higher education institutions integrate sustainability into campus services, infrastructure, transportation, governance, and everyday campus life.

As higher education institutions worldwide increasingly place sustainability at the centre of their strategic development, the need for practical guidance and evidence-informed approaches has become more important than ever. Universities are adopting sustainability strategies, climate action plans, and green transition frameworks to address environmental, social, and economic challenges while aligning with international commitments and societal expectations. We hope that this brochure will serve as a valuable resource for institutions seeking to advance these efforts. By promoting a holistic approach to campus sustainability, this brochure aims to support the development of universities that are environmentally responsible, socially inclusive, innovative, and resilient in the face of future challenges.

Achieving meaningful sustainability outcomes requires the active participation of the entire university community. While institutional strategies, policies, and investments provide the necessary framework for change, students, academic staff, administrative personnel, and external stakeholders all play an important role in shaping more sustainable campus environments. Sustainability is most effective when it becomes part of everyday decision-making, behaviours, and campus culture.

Chapter 1: Green Campus and Sustainable Living

The first chapter examines how daily activities and campus settings promote wellbeing, sustainability, and closer ties to the natural world. It presents useful concepts for green spaces, outdoor learning areas, rooftop gardens, biodiversity, sustainable food services, and ecologically friendly campus maintenance. The chapter also highlights how campus sustainability culture may be strengthened and more sustainable lifestyles encouraged through student involvement, outdoor activities, and awareness campaigns.



Chapter 2: Smart Energy and Digital Efficiency

Energy-efficient campuses and clever digital solutions that lower energy use and carbon emissions are the main topics of the second chapter. The chapter offers useful strategies for energy storage, renewable energy, smart lighting, intelligent HVAC systems, building management systems (BMS), paperless administration, and sustainable digital infrastructure. It focuses on how current technologies and energy-conscious management can help colleges improve operational efficiency, reduce costs, and create more pleasant and intelligent learning environments.

Chapter 3: Circular Resources: Waste, Water, and Materials

Circular resource management in higher education institutions is examined in the third chapter. It presents practical methods for water management, recycling systems, refill stations, repair centres, waste sorting, and sustainable purchasing. To reduce waste, conserve resources, and improve circular processes on campuses, the chapter highlights the importance of integrating infrastructure, behavioural change, and monitoring systems.

Chapter 4: Smart Mobility and Sustainable Travel

Sustainable mobility and travel practices in higher education are covered in the fourth chapter. The chapter offers practical suggestions for encouraging walking, cycling, public transport, car-sharing, electric mobility, and virtual cooperation because mobility is a major source of campus-related carbon emissions. Additionally, it contains motivational examples from European universities that show how behavioural strategies, infrastructure, and incentives can promote healthier and greener commuting practices.

Chapter 5: Governance, Engagement, and the Sustainability Roadmap

The fifth chapter focuses on governance, participation, and long-term sustainability strategies. It emphasises how crucial leadership, teamwork, employee involvement, and institutional culture are to bringing about long-lasting change. To help universities integrate sustainability into institutional practice and daily campus life, the chapter presents governance models, sustainability roadmaps, living labs, participatory techniques, and frameworks for continual improvement.

Chapter 6: Green Campus checklist

This chapter is very practically oriented. It offers a user-friendly Green Campus Checklist to help universities implement sustainable practices and foster a culture of environmental responsibility across the entire campus community.

With the help of this booklet, we seek to encourage HE institutions to step up their sustainability initiatives and assist staff, leadership, and campus communities in building more resilient, healthy, and environmentally friendly learning environments for present and future generations.



Green Campus and Sustainable Living

1.1 Introduction

Creating a sustainable campus begins with the physical environment and the people who interact with it every day. Campus buildings, green spaces, utilities, transportation systems, and support services influence not only resource consumption and environmental performance but also the behaviours, attitudes, and well-being of students, staff, and visitors. A sustainable campus, therefore, functions as both a living environment and a learning ecosystem, in which infrastructure and human engagement work together to promote responsible, environmentally conscious practices.

The quality of campus life is closely linked to the availability of green spaces, biodiversity, outdoor learning environments, and sustainable services. Accessible and attractive natural areas encourage social interaction, active lifestyles, environmental awareness, and a stronger sense of belonging to the university community. Well-designed campuses contribute not only to environmental protection but also to the physical and mental well-being, comfort, and overall satisfaction of campus users (Tiyarattanachai & Hollmann 2016; Sugiarto et al. 2022).

A green campus promotes sustainable infrastructure through energy-efficient buildings, renewable energy use, green spaces, sustainable water and waste management, eco-friendly materials, sustainable food services, and sustainable transport options such as cycling and public transport.

A green campus's "people" component is about well-being, participation, education, and everyday behavioral practices.

Several international sustainability initiatives and green rating systems highlight the importance of green and people-centred campus environments (Sugiarto et al. 2022):

- **UI GreenMetric Ranking**
- **EUA Green Deal Roadmap**
- **Guidelines for the implementation of sustainability in higher education institutions**
- **DEA-Gemetric**
- **United Nations Environment Program**

Universities such as the **University of Nottingham**, **University of Kasetsart**, and **University of Copenhagen**, demonstrate how campuses can successfully combine sustainability, biodiversity, and well-being (Sütüncü 2025, Vrinda International 2024, UI Green Metric 2026).

CASE OF

University of Nottingham, UK

KEY FACTS (Sütüncü 2025, UI Green Metric 2026):

-  **32%** reduction in energy consumption (between 2010 and 2021)
-  **300** -acre park campus is home to diverse ecosystems, **240** species of birds and **800** species of plants on the campus
-  **65%** recycling rate in 2021
-  **65%** of all journeys to and from the university are made by sustainable modes of transport
-  sustainability integrated into study programmes across all faculties



On UI GreenMetric Ranking,
the university was ranked

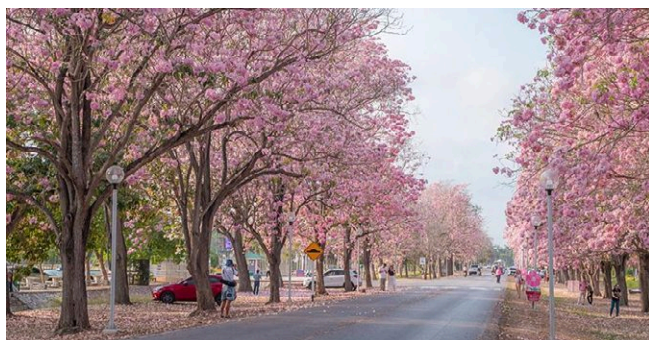
3rd place | TOTAL SCORE of
IN 2025 | **9562.5** points

CASE OF

University of Kasetsart, Thailand

KEY FACTS (UI Green Metric 2026, KU 2026):

Kasetsart University attributes this achievement to the strong environmental commitment of its faculty, staff, current students, and alumni. The university also extends its sincere appreciation to all departments and campuses whose collective efforts and concrete actions in advancing sustainable and environmentally friendly university initiatives have contributed to this continued success.



Thailand's
TOP GREEN UNIVERSITY
for five consecutive years
(2021–2025)

On UI GreenMetric Ranking,
the university was ranked

22th place | TOTAL SCORE of
IN 2025 **9162.5** points

KU

KASETSART UNIVERSITY
SRIRACHA CAMPUS



University of Kasetsart (source: archive of the University)

CASE OF

University of Copenhagen, Denmark

KEY FACTS (Sütünç 2025):

-  **47%** reduction in energy consumption (between 2006 and 2011)
-  **25%** of the campus is dedicated to green spaces
-  **58%** recycling rate in 2021
-  **75%** sustainable mode of transport used by staff & students
-  sustainability is integrated into **30%** of study programmes



1.2 Infrastructure for Sustainable Campuses

1.2.1 Sustainable Campus Spaces and Infrastructure

Creating Green Campus Spaces

Green spaces are an essential component of sustainable campus infrastructure. Trees, gardens, shaded walkways, and outdoor seating areas support biodiversity, climate resilience, and more attractive campus environments (ISCN 2014, Roser 2024).

Well-designed green spaces can:

- improve biodiversity,
- reduce heat,
- enhance air quality,
- support rainwater absorption,
- and encourage more sustainable campus environments

Examples of green campus spaces:

- biodiversity and pollinator gardens,
- shaded outdoor study areas,
- green walking and pedestrian-friendly paths,
- edible gardens,
- nature-friendly courtyards.

Green Roofs and Rooftop Gardens

Green roofs and rooftop gardens are becoming increasingly significant infrastructure solutions, especially for urban campuses with limited space (Barnett-Itzhaki et al. 2025, Roser 2024).

Green roofs help:

- reduce heat,
- improve insulation,
- retain rainwater,
- support biodiversity,
- and create habitats for birds and pollinators.

Beyond environmental benefits, rooftop gardens can become inspiring campus spaces for:

- relaxation,
- outdoor learning,
- student gardening projects,
- social interaction,
- well-being activities.

Because these installations serve as living labs for environmental science, design, and sustainability studies, universities that embrace green roofs also get educational benefits (Kalicka 2021). Their visibility further reinforces institutional commitment to sustainability.





Illustrative Example of a Green Roof and Rooftop Garden

Supporting Biodiversity Through Ecological and Blue-Green Infrastructure

Well-planned green areas on university campuses can help preserve biodiversity and create more climate-friendly surroundings. To create campuses that are more nature-positive, even minor adjustments can have a significant impact (Sugiarto et al. 2022).

Examples:

- tree-lined paths,
- flower meadows,
- hedgerows,
- small water features,
- rain gardens,
- planted drainage areas.

These features can support biodiversity, absorb rainwater, reduce heat, and improve campus environments.

Practical Ideas:

- connect green spaces,
- use native plants,
- create pollinator-friendly areas,
- introduce rain gardens,
- install biodiversity signs.



You are invited to watch this video about
**Exploring Biodiversity Strategies
in Higher Education**

Energy, Water, Waste and Materials

Energy-efficient buildings, renewable energy use, and sustainable management of water, waste, and materials are important components of green campus infrastructure (Barnett-Itzhaki et al. 2025, Kalicka 2021). More information about these dimensions is provided in **Chapters 2 and 3 of this brochure**.

Sustainable mobility - Environmentally Friendly Campus Transportation

University campuses can encourage more sustainable and healthier mobility through:

- bicycle infrastructure,
- pedestrian-friendly pathways,
- electric vehicle charging stations,
- shared mobility systems,
- improved public transport access.

Sustainable mobility can help reduce campus emissions, improve air quality, decrease traffic congestion, and support healthier everyday lifestyles (Sgarra et al. 2021, U-MOB LIFE 2021).

Practical Ideas:

- covered bicycle parking,
- bike-sharing systems,
- pedestrian green corridors,
- car-free campus zones.

More about this dimension is described in **Chapter 4 of the brochure**.

1.2.2 Promoting Sustainable Campus Services and Everyday Living

Campus dining areas are important spaces for encouraging sustainable lifestyles. Universities may promote lower-carbon and healthier choices by (ISCN 2014, Fucile et al. 2024):

- increasing plant-based meal options,
- promoting local and seasonal food,
- reducing single-use items,
- and displaying simple sustainability information.

Visible carbon footprint displays or eco-labels can raise awareness of sustainable food systems and help staff and students make better decisions (Mahdee et al., 2022).

Practical ideas:

- low-carbon meal of the day
- reusable cup initiatives,
- sustainable food awareness days,
- and water refill stations near dining areas.

You are invited to read cases of sustainable canteens:

Improving sustainability through canteen policies and interventions at three Swiss universities.



1.2.3 Green Campus Care

Campus maintenance practices can support healthier, greener, and more environmentally friendly campus environments.

Examples include:

- biodegradable cleaning products,
- biodiversity-friendly landscaping,
- reduced pesticide use,
- preservation of natural vegetation areas.

Campus biodiversity, ecological quality, and the general campus environment can all be greatly enhanced by simple actions, such as less lawn mowing, native planting, or seasonal biodiversity management (Speake et al., 2013, Kalicka, 2021).

1.3 People: engaging campus communities for sustainable living

1.3.1 Introduction

A green campus's physical base is provided by sustainable infrastructure, but its living core is its people. Even the most sophisticated green infrastructure risks being underutilised or merely symbolic without the active participation of university staff and students. Contemporary sustainability scholarship increasingly emphasises that behavioural change, participation, and social learning are crucial for achieving long-term environmental transformation in higher education institutions (HEIs),

A green campus's "people" component includes **well-being, participation, education, and everyday behavioural practices**. Universities, functioning as microcosms of society, are uniquely positioned to cultivate sustainability-oriented lifestyles that extend beyond campus boundaries into broader communities. HEIs can act simultaneously as **educational institutions, living laboratories, and social innovation hubs** (Sugiarto et al., 2022).

Section 3.2 is divided into three pillars of people-centred sustainability:

1. Sustainability Integration in Teaching and Learning
2. Well-being, Nature, and Outdoor Activities
3. Green Volunteering and Student Engagement

1.3.2 Sustainability Integration in Teaching and Learning

By formally incorporating sustainability subjects into study programs, universities can enhance the human aspect of sustainability. Students gain environmental awareness, critical thinking, responsible citizenship, and the skills necessary to tackle global sustainability concerns when sustainability principles are integrated across disciplines. Higher education establishments facilitate both individual growth and long-term social change via instruction. (Sütünç, 2024).



1.3.3 Green Volunteering and Student Engagement

Volunteering, hands-on learning, campus events, and visible sustainability initiatives provide valuable opportunities for staff and students to actively contribute to campus sustainability. Such activities promote environmental responsibility, sustainability literacy, wellbeing, teamwork, community engagement, and stronger connections with campus spaces. By encouraging active participation, universities can foster a culture of sustainability while empowering students to become active agents of positive environmental and social change (Transform4Europe 2025, Barnett-Itzhaki et al 2025).

Examples of **Sustainability Activities and Community Engagement**:

- tree planting campaigns,
- campus gardening,
- biodiversity projects,
- citizen science activities,
- sustainability awareness campaigns,
- Earth Day events.

Student engagement can be further strengthened through **Student Sustainability Leadership and Governance**, including:

- sustainability ambassador programmes;
- green clubs and sustainability organisations;
- sustainability projects and campaigns;
- participation in sustainability committees and decision-making processes;
- peer-to-peer awareness and behavioural change initiatives.



Many universities also use campuses as “**living laboratories***,” where students participate in projects, such as:

- energy and water use,
- waste reduction,
- biodiversity,
- sustainable mobility,
- and campus well-being.

*More about campuses as ‘living laboratories’; and ideas of initiatives, can be found in the Chapter 3.

Simple everyday initiatives can also encourage more sustainable behaviour on campus. Although often low-cost and easy to implement, such actions can raise awareness, influence behavioural change, and contribute to a stronger sustainability culture across the institution. Examples include::

- “take the stairs” campaigns,
- “meat-free Mondays,”
- reusable cup initiatives,
- energy-saving reminders.

1.3.4 Linking Well-being, Nature, and Outdoor Activities

Green campuses support not only environmental sustainability, but also healthier and more cohesive university communities. Spending time outdoor can enhance social interaction, lower stress levels, promote wellbeing, and make staff and students feel more a part of campus life.

According to research, having access to green spaces can boost social connectedness, lower stress, enhance concentration, and promote physical activity (Speake et al. 2013, Foellmer et al. 2021). Research increasingly demonstrates that contact with nature can also contribute to improved mental health, reduced anxiety, enhanced cognitive performance, and greater academic engagement among students (Völker and Kistemann 2011).



Healthy Academic Greenspaces: Supporting Well-being, Learning, and Community at University

Campus green spaces are frequently used by students to relax, recharge energy, socialise, or take breaks from academic pressure. Well-designed outdoor spaces can be crucial in promoting mental health and general quality of life. By providing restorative environments that help students cope with academic stress, green spaces may contribute not only to well-being but also to a stronger sense of belonging and engagement within the university community.

Simple outdoor activities can help make sustainability part of everyday campus life while supporting health and well-being. Examples include:

- walking meetings,
- outdoor yoga or fitness,
- cycling initiatives,
- and outdoor wellness activities.

These initiatives encourage movement, social interaction, and stronger connections with nature while helping create more active and inclusive campus communities. When supported through campus wellness programs or sustainability events, such activities can become an important part of university culture (Sugiarto et al. 2022, Foellmer et al. 2021).



1.4 Key performance indicators – ideas

1.4.1 Infrastructure and Biodiversity KPIs

Area	Example KPI
Green campus spaces	% of campus covered by green areas
Tree canopy coverage	% of campus covered by tree canopy
Biodiversity	Number of native plant species
Green roofs	m ² of green roofs installed
Ecological connectivity	Number of connected biodiversity areas/corridors
Blue-green infrastructure	Number of rain gardens or vegetated drainage areas
Stormwater management	% of rainwater retained or managed on-site
Sustainable mobility	% of students/staff using sustainable transport
Mobility initiatives	Number of walking, cycling, or sustainable mobility initiatives
Cycling infrastructure	Number of bicycle parking spaces
Sustainable food	% of products from local farmers offered in canteen
Waste reduction	Reduction in single-use plastics (%)
Waste recycling	% of waste recycled
Carbon emissions	Annual CO ₂ emissions per student/staff member
Energy reduction	Reduction in energy consumption (%)
Renewable energy	% of campus energy derived from renewable sources
Water consumption	Water consumption per student/staff member
Water access	Number of water refill stations
Sustainable maintenance	% of biodegradable cleaning products used

1.4.2 People, Learning, and Engagement KPIs

Area	Example KPI
Sustainability in study programmes	% of study programmes in which sustainability is integrated
Outdoor learning	Number of courses using outdoor learning environments
Research	% of research conducted on sustainability-related topics
Sustainability publications	Number of sustainability-related publications
Sustainability projects	Number of sustainability-related campus projects
Student engagement	Number of participants in sustainability activities
Student organisations	Number of active sustainability-related student organisations
Campus well-being	Participation in outdoor/well-being programmes
Well-being perception	% of students/staff reporting positive effects of campus green spaces on well-being
Nature connectedness	Student/staff self-reported connection to nature score
Sustainability awareness	Number of sustainability campaigns/events
Campus community	Student/staff satisfaction with sustainability initiatives
Community engagement	Number of community-based sustainability activities or partnerships

1.4.3 From Suggested KPIs to Comprehensive Sustainability Assessment

The above-mentioned indicators are suggestions derived from the themes and concepts discussed in Chapter 1 of this publication. They are intended to provide institutions with a **practical starting point for monitoring and evaluating the sustainability performance of their campuses**, particularly regarding infrastructure, biodiversity, learning, engagement, and well-being.

For a more comprehensive set of indicators, institutions are encouraged to consult the **UI GreenMetric Rankings**. As the framework is regularly updated, some indicators may be modified, removed, or added over time. The most recent **UI GreenMetric methodology (2026 edition)** provides a useful reference for institutions seeking to develop a more comprehensive sustainability monitoring system. It consists of **seven categories** (Setting and Infrastructure, Energy and Climate Change, Water, Transportation, Education and Research, Governance and Digitalisation) and **60 indicators**.

1.5 Selected good practices

PRACTICE 1: Eco-Behavior Campaigns for Sustainable Living

Description

Campaigns for eco-behaviour concentrate on changing routine behaviours that, taken as a whole, have a big impact on the environment. These programs employ positive messages, visibility, and social norms to promote sustainable choices in day-to-day campus life rather than depending on regulations or penalties. Frequent awareness campaigns, like Sustainability Days, can strengthen these points and boost community involvement.

Practical Implementation

Common examples include “Take the Stairs” campaigns to reduce energy use, Meat-Free Mondays” to lower the carbon footprint of food consumption, “zero-waste campaigns”, and visual reminders to switch off lights or equipment. Messages are placed in high-traffic areas and reinforced through digital communication. To strengthen impact, campaigns can be periodically highlighted during dedicated campus events through:

- short workshops or demonstrations,
- student-led challenges or competitions,
- interactive activities that encourage active participation.

Feedback mechanisms, such as displaying energy or carbon savings, help maintain engagement.

Value and Impact

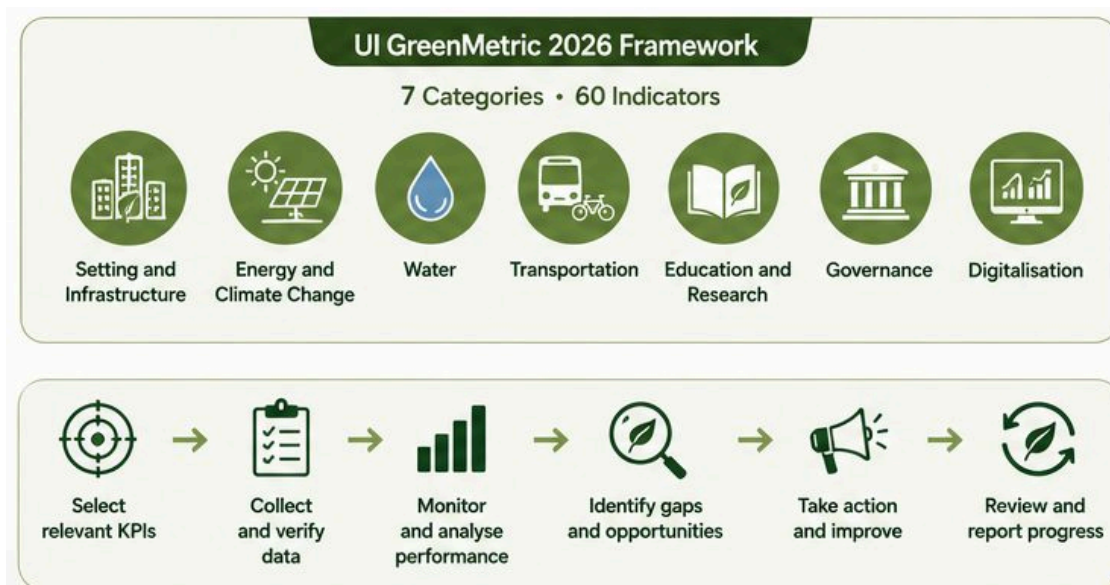
These campaigns are cost-effective, scalable, and quick to implement. They show how simple activities taken together can result in quantifiable environmental benefits and normalise sustainability as part of daily routines. Periodic events help renew interest and broaden participation. Co-designing campaigns with students further enhances ownership and effectiveness.

Key Message

Sustainable living is built through everyday habits—but lasting change happens when daily actions are reinforced by shared experiences and collective engagement.

Sources of idea for practice: Sugiarto et al. 2022, Demetriou et al 2025; U-Green 2023





PRACTICE 2: Organic Gardens and Vegetable Roofs Implementation

Description

Organic gardens and vegetated roofs (green roofs) are an efficient natural way to turn unused rooftop areas into ecological and productive spaces. By integrating vegetation into building infrastructure, universities can contribute to carbon reduction, improve air quality by capturing fine particles, support urban biodiversity, and enhance water management through natural drainage. Green roofs also enhance acoustic performance and thermal insulation, which promotes energy efficiency and campus sustainability.

Practical Implementation

Implementation involves converting suitable rooftop areas into vegetated surfaces using layered systems comprising waterproofing, drainage, soil substrate, and plant cover. Depending on the design, roofs can host:

- extensive green roofs (low-maintenance vegetation), or
- intensive green roofs (including vegetable gardens and accessible green spaces).

Typical steps include:

- structural assessment of roof load capacity,
- waterproofing and drainage installation,
- addition of growing medium (soil substrate),
- planting of vegetation (grass, herbs, vegetables, or native species),
- integration into teaching, research, or community gardening initiatives.

Value and Impact

Green roofs bring multiple environmental, economic, and social benefits. They reduce CO₂ emissions and airborne pollutants, improve stormwater management, and mitigate the urban heat island effect. From an institutional perspective, their better insulation helps save energy expenses. Socially, they provide opportunities for experiential learning, student engagement, and well-being. When used as educational spaces, they strengthen interdisciplinary learning and sustainability awareness.

Source of practice: **U-Green 2023**



PRACTICE 3: Sustainable and Local Food Procurement in Campus Dining

Description

To lessen the environmental impact of campus dining while promoting regional economies and better lifestyles, sustainable procurement focuses on obtaining food that is seasonal, local, and mostly plant-based.

Practical Implementation

Universities adopt procurement policies that prioritise:

- local and seasonal food suppliers,
- plant-based meal options,
- reduced meat consumption,
- transparent food sourcing and eco-labelling.

Menus are redesigned to reflect sustainability principles, and canteens provide information on environmental impacts to guide user choices.

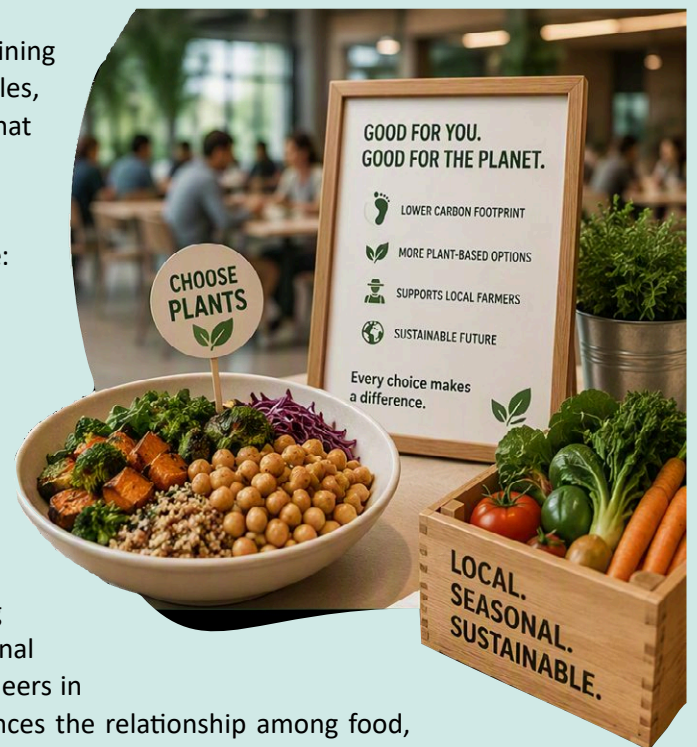
Value and Impact

Sustainable procurement encourages healthy eating habits, lowers carbon emissions, and supports regional producers. In addition to establishing colleges as pioneers in sustainable consumption habits, this approach enhances the relationship among food, the environment, and community.

Key Message

Sustainable food starts with responsible sourcing.

Source of practice: Fucile et al. 2024.



1.6 Quick wins

- ✓ Set KPIs for green campus & monitor them.
- ✓ Launch a green campus student competition.
- ✓ Encourage the use of outdoor spaces for learning, meetings, or wellbeing activities.
- ✓ Showcase and share existing good sustainability practices across the campus. When you have a project idea, look at what other universities are doing for inspiration.
- ✓ Evaluate and strengthen the sustainability competencies of staff responsible for the operation and maintenance of the campus.
- ✓ Choose which green building Standards and Certification System to use. Identify existing campus buildings with the greatest potential for retrofitting to green building standards.



1.7 Reference list

1. Barnett-Itzhaki, Z., Tieret, S., Berkowic, D., Arviv, T., Daya, A., Carasso Romano, G. H., & Levi, A. (2025). Strategies and challenges for green campuses. *Frontiers in Sustainable Cities*, 7, 1469274. <https://doi.org/10.3389/frsc.2025.1469274>
2. Demetriou, E., Vatisas, C., Anne, O., Penezić, Z., & Fokaides, P. (2025). Advancing green university campuses: Challenges, best practices, and the role of environmental management systems. *IOP Conference Series: Earth and Environmental Science*, 1558, 012001. <https://doi.org/10.1088/1755-1315/1558/1/012001>
3. European University Association (EUA). (2022). Universities without walls: A vision for 2030 and the EUA Green Deal roadmap. <https://www.eua.eu/downloads/publications/eua%20green%20deal%20roadmap.pdf>
4. Foellmer, J., Kistemann, T., & Anthonj, C. (2021). Academic greenspace and well-being—Can campus landscape be therapeutic? Evidence from a German university. *Wellbeing, Space and Society*, 2.
5. Fucile, A., et al. (2024). *A sustainable and circular approach to food systems in universities: An overview*. In *Sustainable Development and Planning 2024* (WIT Transactions on Ecology and the Environment). WIT Press. <https://www.witpress.com/Secure/elibrary/papers/SDP24/SDP24083FU1.pdf>
6. ISCN. (2014). *Best practice in campus sustainability*. World Economic Forum & ISCN.
7. Kalicka, N. B. (2021). *Improving green space and biodiversity on university campuses: Is the green space on campus more than just an aesthetic?* Master's thesis, Radboud University, Nijmegen.
8. Kasetsart University. (2026). *Webpage*. <https://www.ku.ac.th/th>
9. Mahdee, J., Abu Bakar, N., & Oh Kim Seng, V. (2022). Green campus universities: Case studies on problems and prospects. *F1000Research*, 11, 1200. <https://doi.org/10.12688/f1000research.73381.1>
10. Roser-Chinchilla, J.; Galán-Muros, V.; Banerjee, I. (2024). The emergence of the green campus: leading climate action and preserving ecosystems. *SDG briefs series. Goal 13. UNESCO IESALC*.
11. Speake, J., Edmondson, S., & Nawaz, H. (2013). Everyday encounters with nature: Students' perceptions and use of university campus green spaces. *Human Geographies – Journal of Studies and Research in Human Geography*, 7(1), 21–31. <https://doi.org/10.5719/hgeo.2013.71.21>
12. Sgarra, V., Meta, E., Saporito, M. R., Persia, L., & Usami, D. S. (2021). Improving sustainable mobility in university campuses: The case study of Sapienza University. *Transportation Research Procedia*, 60, 221–228.
13. Sugiarto, A., Lee, C.-W., & Huruta, A. D. (2022). A systematic review of the sustainable campus concept. *Behavioral Sciences*, 12(5), 130. <https://doi.org/10.3390/bs12050130>
14. Sütünc, H. S. (2025). Green campus initiatives: Assessing the impact and necessity of sustainable practices in higher education institutions. *Journal of Anatolian Environmental and Animal Sciences*, 10(1), 15–24. <https://doi.org/10.35229/jaes.1539272>
15. Tiyyarattanachai, R., & Hollmann, N. M. (2016). Green campus initiative and its impacts on quality of life of stakeholders in green and non-green campus universities. *SpringerPlus*, 5 (84). <https://doi.org/10.1186/s40064-016-1697-4>
16. Transform4Europe (2025). *TRANSFORM4EUROPE: the European university for knowledge entrepreneurs*. Green Campus Handbook.
17. U-GREEN Consortium. (2023). *U-GREEN guidelines for education and training institutions (Version 2)*. Erasmus+ Programme, KA220-HED Cooperation Partnerships (Project No. 2021-1-ES01-KA220-HED-000031988). <https://www2.ual.es/u-green/wp-content/uploads/2023/06/U-GREEN-GUIDELINES-V2.pdf>
18. UI Green Metric. (2026). *Website*. <https://uigreenmetric.com/>
19. U-MOB LIFE (2021). *European Network for Sustainable Mobility at Universities*. European Commission LIFE Programme. <https://u-mob.eu/>
20. Völker, S., Kistemann, T. (2011). The impact of blue space on human health and well-being –Salutogenetic health effects of inland surface waters: a review. *International Journal of Hygiene and Environmental Health*, 214(6), 449–460.
21. Vrinda International. (2024). *Eco-friendly universities in Europe*. <https://vrinda-international.com/eco-friendly-universities-in-europe/>

2. Smart Energy and Digital Efficiency

2.1 Automation and Intelligent Management Solutions (BMS)

Modern building automation systems are now the foundation of intelligent, comfortable, and energy-efficient academic campuses. Today's BMS, that is, the building management system, acts as the "brain" of the entire facility. It connects all the most important installations in one place — heating, ventilation, air conditioning, lighting, blinds, and even security and energy systems.

Unlike older solutions, modern systems use the Internet of Things (IoT), data analytics, and increasingly artificial intelligence (O'Neill et al. 2019). Thanks to this, they can predict how much energy will be needed and continuously adjust device operation. The building not only reacts to what is happening but can also act "in advance"—for example, by activating the blinds earlier if it predicts that the sun will heat the rooms from the south.

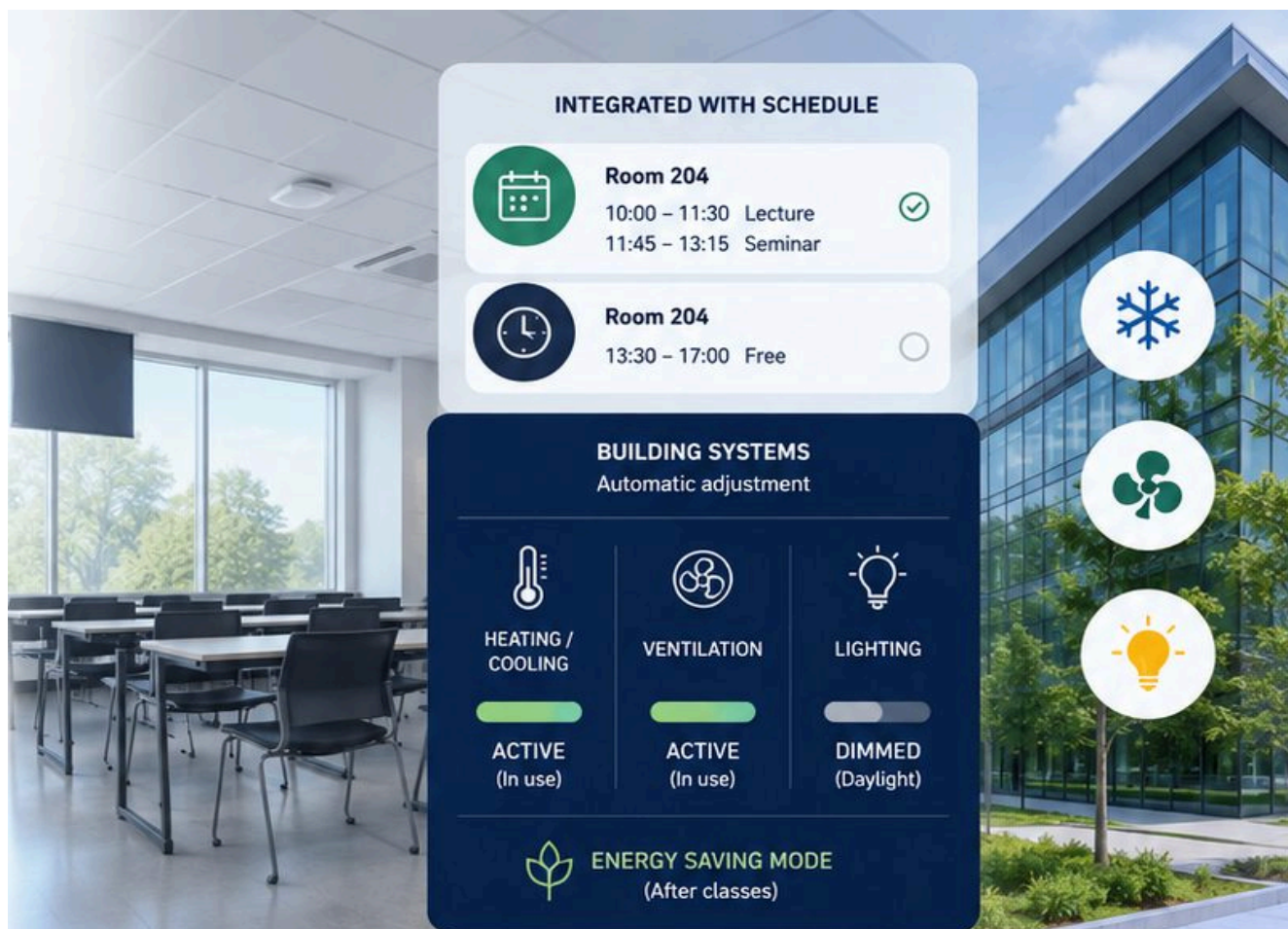
Automatic adjustment to how the rooms are actually used

At universities, rooms are occupied at different times, and the schedule can change from day to day. The BMS can connect to the reservation system and class schedule, so that heating, cooling, and ventilation operate only when the room is in actual use. After classes, the system automatically switches to an energy-saving mode.

Lighting can adjust itself to daylight — if the room is bright, LED lamps dim or turn off. During semester breaks, the entire building switches to a low-energy-consumption mode.



Intelligent Building Management System Automatically Adjusting to Classroom Occupancy and Schedules



Smart Campus Technologies Supporting Wellbeing and Sustainability

Sensors that “see” and “feel” what is happening in the building

In classrooms, corridors, and common areas, sensors are placed that detect motion, temperature, humidity, air quality, or light. Thanks to them, the system can precisely adjust conditions to users’ needs (Luo et al. 2022, Satish et al. 2012):

- the light in the corridor turns on only when someone walks,
- ventilation increases its speed when CO₂ levels rise,
- an open window automatically turns off heating or air conditioning,
- the system can adjust ventilation to the number of people in the room.

All of this improves comfort while reducing energy waste (Hong et al. 2017).

Connection with renewable energy

More and more often, the BMS cooperates with photovoltaic installations, energy storage systems, and energy management systems. Thanks to this, the building can intelligently control the flow of electricity—for example, draw more energy from solar panels, charge storage units during cheaper hours, or reduce consumption during peak times (O’Neill et al. 2019).

The effect? Lower costs and greater comfort

A well-functioning building management system can reduce energy consumption by 20–40% (Srivastava 2025). The university pays less for electricity and heating, and students and staff benefit from modern, comfortable, and safe spaces.

Reference to Energy Standards

In recent years, regulations have become much stricter, which means universities must design and modernise their facilities to use as little energy from fossil fuels as possible. In practice, this means the need to use low-emission technologies, renewable energy sources, and advanced building automation that optimises installation operation.

Energy classes A and A+ will soon become mandatory for new and modernised public buildings, including university facilities. Achieving these standards requires a combination of photovoltaics, energy storage, heat pumps, heat recovery, intelligent lighting, EMS and BMS — all working together to reduce energy demand and increase the share of renewable energy.

Adapting buildings to these requirements is not only a legal obligation but also a strategic advantage: lower operating costs, higher building value and a stronger institutional image.

Modernisation of the BMS and Intelligent Lighting Control

The University of Reading implemented a comprehensive upgrade of its Building Management System (BMS), integrating advanced HVAC control strategies and intelligent lighting systems equipped with occupancy sensors and daylight-responsive dimming. The modernisation targeted several high-use academic buildings, where legacy systems operated on fixed schedules and static setpoints.

The upgraded BMS enabled continuous monitoring of indoor environmental parameters, real-time occupancy detection, and dynamic adjustment of heating, cooling, and lighting loads. As a result, the university achieved 30–35% energy savings across the renovated buildings. The most significant improvements stemmed from optimised HVAC scheduling based on actual occupancy patterns and from reducing artificial lighting demand through automated daylight harvesting.

The project is recognised as a leading example of how digital building automation can enhance energy performance in European higher education institutions while maintaining stable comfort conditions for students and staff (University of Reading, 2020).

Importantly, the data generated by the smart systems described in Chapter 2 forms the analytical foundation for the governance and monitoring frameworks presented in Chapter 5. This creates a continuous link between technical infrastructure and institutional decision-making, ensuring that energy performance insights directly support strategic planning and campus-wide management (Luo et. al 2022).



2.2 Human-centric perspective — why technology matters for people

Modern smart-energy solutions on campus — **BMS, HVAC, intelligent lighting, renewable energy systems** — are not only technical infrastructure. They shape the **daily experience of staff and students**, influencing how people **feel, work, learn, and function** in university spaces. Every technological choice affects comfort, concentration, well-being, and the overall quality of the indoor environment.

Comfort and well-being as core outcomes of smart systems

Building automation does more than optimise energy use — it **actively supports human comfort and health** (Fisk 2017). Through sensors that monitor air quality, temperature, humidity and occupancy, the building:

- maintains stable thermal conditions without sudden fluctuations,
- increases ventilation before users feel drowsy or lose focus,
- reduces noise and drafts,
- adjusts lighting to the rhythm of the day and the type of activity (Zhang et. al. 2010).

As a result, the campus becomes a **healthier, more predictable and more pleasant place to work and study** (Satish et. al 2012).



Smart Indoor Environments Supporting Comfort and Learning Performance

Lighting that supports concentration and cognitive performance

Human-Centric Lighting automatically adapts colour temperature and intensity (Boyce 2014) to:

- cognitive tasks,
- teaching activities,
- relaxation needs,
- time of day.

This reduces visual fatigue, improves concentration, and enhances overall comfort in learning and working environments.

A sense of control and predictability

Smart systems create spaces that:

- **respond to people's presence,**
- **avoid unnecessary energy use,**
- **maintain stable indoor conditions,**
- **do not require constant manual adjustments.**

For staff, this means fewer distractions and a calmer working environment. For students, it means better conditions for learning, collaboration and project work.

Users as co-creators of energy efficiency

Technology does not operate in isolation — its effectiveness also depends on user behaviour:

- how spaces are used,
- whether windows are opened,
- lighting habits,
- energy-related routines.

Smart systems learn from these patterns and respond to them, while also **supporting users in making more conscious choices** (Hong et. al 2017). This fosters a sense of **shared responsibility**, rather than a divide between “technology” and “people”.



2.3 HVAC Solutions (Heating, Ventilation, Air Conditioning)

HVAC systems — that is, heating, ventilation, and air conditioning — are some of the most important installations in university buildings (Fisk 2017). They are responsible for thermal comfort, fresh air, and... a significant portion of the energy bills. On modern campuses, increasingly intelligent solutions are used to regulate temperature on their own, recover heat, and control airflow. Thanks to this, buildings are more comfortable and have lower operating costs.

Heat recovery — reclaiming heat that would normally escape

In traditional buildings, a huge portion of energy escapes through ventilation — even 40–60% of all heat losses. Heat recovery makes it possible to reclaim a large part of this energy. The air exhausted from the building transfers its heat (or cooling) to the fresh air about to enter the rooms.

In practice, this means that the air supplied to lecture halls, laboratories, or offices is already pre-heated in winter and pre-cooled in summer. Comfort increases, and energy consumption decreases (Zhang et. al. 2010). In universities, where ventilation operates practically all the time, the savings are particularly significant.

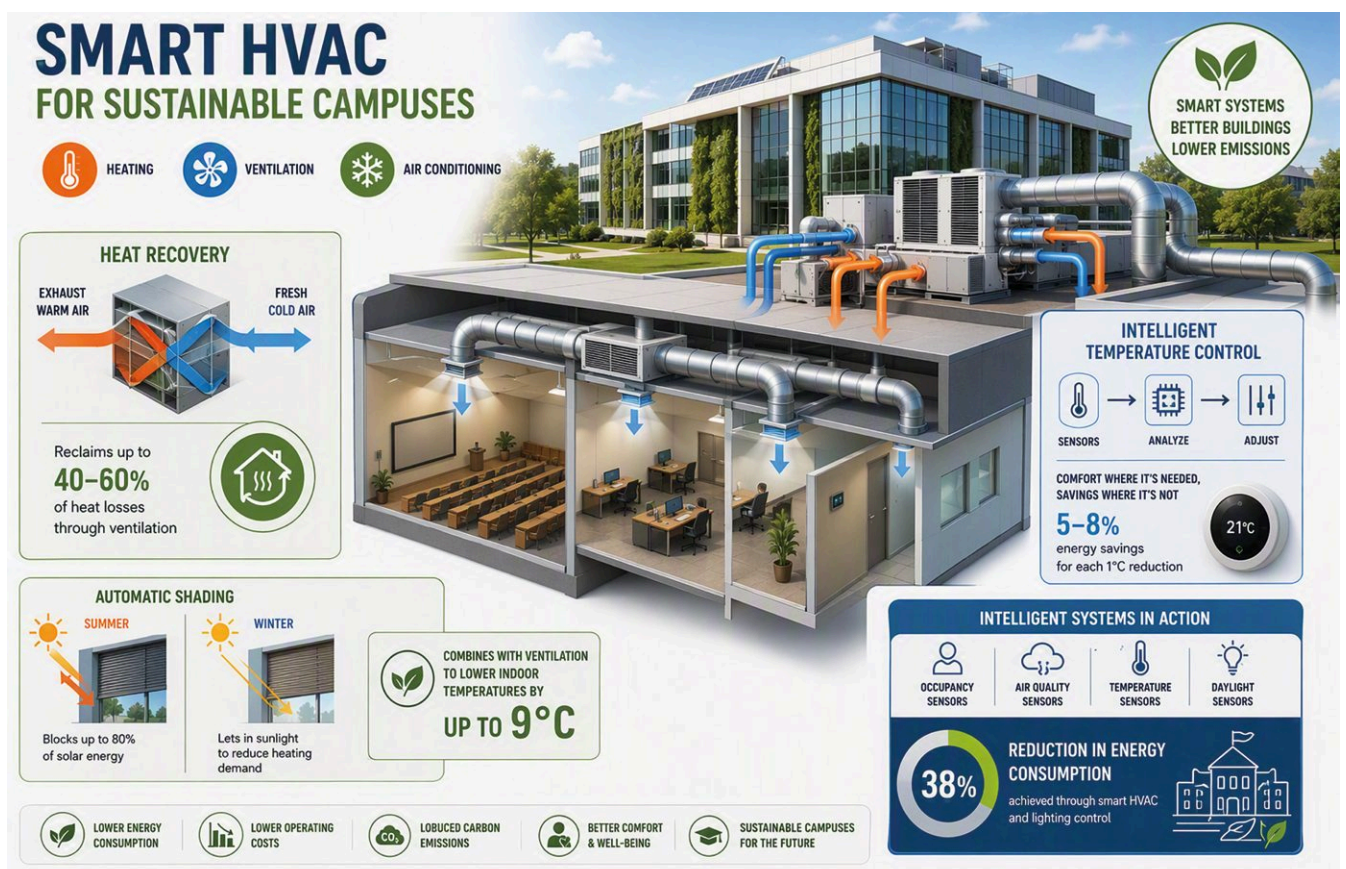
Intelligent temperature control — comfort without wasting energy

Modern HVAC systems can precisely adjust the temperature based on what is happening in the building. Even lowering the temperature by 1°C can reduce energy consumption by 5–8%, which is why zoned control is increasingly used — separately for classrooms, corridors, laboratories, or offices.

The system analyses data from occupancy, air-quality, and temperature sensors, and then decides how to operate. If a room is empty, the temperature automatically drops and ventilation switches to an energy-saving mode. When users appear, everything returns to comfortable settings.

Automatic shading — blinds that cooperate with air conditioning

Intelligent blinds and shades play an increasingly important role. On hot days, they can block up to 80% of solar energy, which means rooms heat up much more slowly. This reduces the load on the air conditioning system.



Studies show that combining automatic shading with good ventilation can lower indoor temperatures by up to 9°C — and this without using an air conditioner. In winter, blinds can let in more sunlight, helping to warm rooms and reduce heating energy consumption.

Implementation of Intelligent HVAC and Lighting Control

The University of California carried out a modernisation of its building management systems, introducing advanced HVAC control and intelligent lighting equipped with occupancy sensors and automated daylight harvesting. The upgrade targeted high-use instructional buildings, where traditional ventilation and lighting systems with fixed operating parameters had previously dominated.

Following the implementation of the automation systems, the monitored buildings achieved a **38% reduction in energy consumption**. The greatest savings resulted from dynamically adjusting HVAC operation to actual occupancy patterns and optimising lighting performance based on available daylight. The project has been recognised as one of the key initiatives improving the campus's overall energy efficiency (University of California, Davis Energy Conservation Office, 2021).

2.4 Energy-Efficient Lighting

Lighting is one of the most important factors affecting comfort in a building and, at the same time, a major component of electricity bills. In traditional university facilities, it can account for 20–30% of electricity consumption, which is why its modernisation delivers quick and noticeable savings. Modern lighting systems are based on LEDs, motion and light sensors, and integration with the building management system (BMS). Thanks to this, the light operates exactly where and when it is needed.



LEDs — the foundation of modern lighting

Today's LED fixtures use even 60–80% less energy than traditional bulbs, and they also last much longer. However, the greatest savings appear when LEDs work together with intelligent control.

In lecture halls, laboratories, and offices, daylight sensors are used. If a lot of sunlight enters the room, the system automatically dims the lamps or turns them off completely. This ensures ideal working conditions for users while preventing energy waste.

Presence sensors — light only when someone is nearby

In corridors, restrooms, staircases, or common areas, motion sensors play a key role. Modern sensors can detect even small movements, so the light turns on only when someone is actually using the space. After users leave, the lamps automatically turn off or switch to dimmed mode.

When combined with LEDs, this can reduce energy consumption by 70–90% compared to traditional installations.

IoT-based lighting — every lamp becomes “intelligent”

Systems in which each fixture is connected to a network of sensors and a central control system are becoming increasingly common. Thanks to this, it is possible to create different lighting scenes tailored to the type of activity — one for lectures, another for laboratory work, exams, or project work.



The system also analyses room usage data and automatically optimises settings, further reducing energy consumption.

Integration with BMS — full automation

In modern campuses, lighting is connected to the BMS, which coordinates it with other installations. Thanks to this:

- the lighting can operate according to the class schedule,
- after a room is vacated, lighting automatically turns off, the temperature is lowered, and ventilation is reduced,
- the system can respond to air quality — for example, increase ventilation and simultaneously adjust lighting.

This makes the building operate coherently and efficiently.

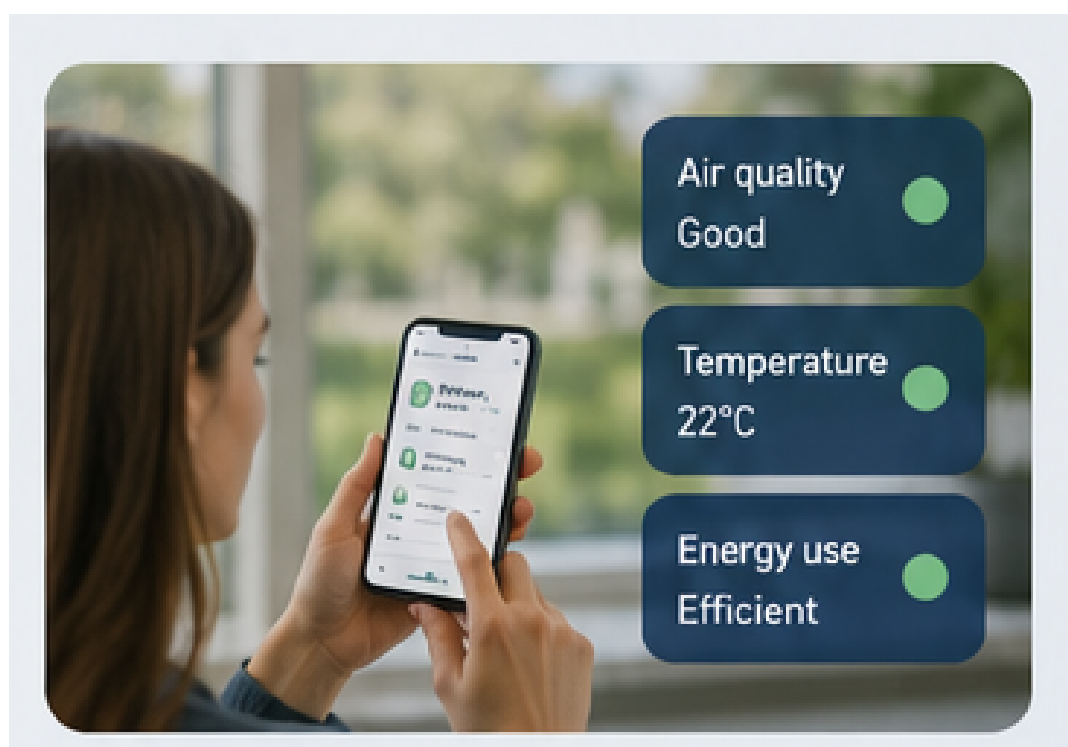
Human-Centric Lighting — light adapted to the human rhythm

Systems that adjust the colour and intensity of light to the natural circadian rhythm are becoming increasingly popular. In lecture halls, the light can be cooler and stimulating, while in relaxation areas, it can be warmer and calming. Studies show that such lighting improves concentration, well-being, and learning effectiveness ((Boyce 2014).

IoT System and Predictive Algorithms for HVAC Control

Politecnico di Torino implemented an advanced energy management system based on a network of IoT sensors and predictive algorithms designed to optimise HVAC operation in teaching and laboratory buildings. The system continuously monitors environmental parameters (temperature, humidity, CO₂ levels), occupancy patterns, and variations in thermal load, and then automatically adjusts the operation of heating, cooling, and ventilation systems.

The use of predictive modelling techniques (including machine learning) enabled accurate forecasting of energy demand and reduced system operation during periods of low load. As a result, the buildings achieved a **25–45% reduction in energy consumption**, while maintaining stable indoor comfort conditions for occupants. The project is recognised as a strong example of how IoT technologies can effectively enhance the energy performance of academic infrastructure (Messervey et al., 2024).



Green IT Infrastructure and Intelligent Energy Management on Campus

2.5 Energy Production and Storage (RES)

Modern universities are increasingly becoming active participants in the energy transition. They are no longer just energy consumers — more and more often, they produce, store, and intelligently use energy themselves. Renewable energy installations, such as photovoltaic systems and solar collectors, help reduce costs, increase energy independence, and lower the campus's carbon footprint. When combined with energy storage systems and intelligent management systems, the university gains full control over how and when it uses electricity.

Photovoltaics — the most popular energy source on campuses

The most commonly used solution is photovoltaic panels installed on the roofs of academic buildings, libraries, sports halls, or above parking areas (carports). Modern PV modules are efficient, resistant to shading, and work together with energy-production monitoring systems.

Thanks to this, the university can:

- monitor energy production in real time,
- predict yields based on weather conditions,
- adjust consumption to the current generation,
- use dynamic tariffs and the net-billing system (Luthander et al. 2015).

The result? Lower bills and greater control over energy, especially during peak building-load hours.

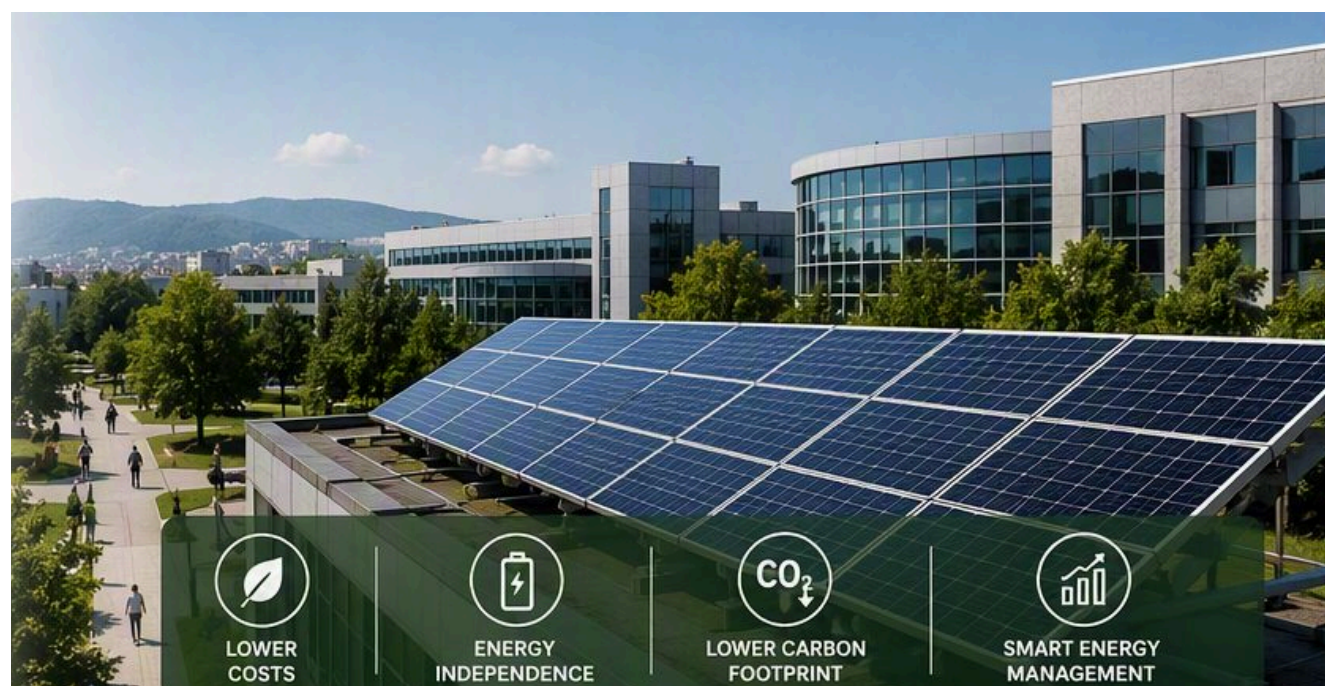
Energy storage — electricity when it is needed most

Energy storage systems, which store surplus energy produced during the day, play an increasingly important role (Parra et. al. 2017). These can be lithium-ion storage units, LFP systems, or “second-life” batteries recycled from electric vehicles.

Thanks to storage systems, the university can:

- increase self-consumption of renewable energy by 30–60%,
- reduce electricity drawn from the grid during peak hours,
- protect itself in case of power outages,
- power electric-vehicle chargers with PV energy.

This means not only savings, but also greater energy stability for the campus(Parra et. al. 2017).



Green IT infrastructure — energy-efficient server rooms and cloud computing

Modern universities also invest in more ecological IT infrastructure. Replacing old servers with energy-efficient models can reduce energy consumption by 30–50%. Virtualisation and resource consolidation mean that fewer physical devices are needed, thereby reducing cooling costs.

Cloud computing is also playing an increasingly important role. Cloud service providers use data centres powered by renewable energy and optimised for energy efficiency. Thanks to this, the university:

- reduces its carbon footprint,
- increases the security and scalability of its systems,
- does not need to maintain excessive local infrastructure.

Modern data centres can even recover heat from servers and transfer it to building heating systems.

Paperless administration — faster, cheaper, and more ecological

Transitioning to digital administration is another step toward a modern and sustainable campus. Digitising processes reduces paper consumption, speeds up document workflows, and improves data security (Gomes 2023).

The most important elements are:

Digital archives

They enable storing documents in electronic form, quick searching, and automatic backup creation.

E-signatures

They allow documents to be signed remotely — quickly, securely, and legally. They are useful in admissions, student services, HR, and partner collaboration.

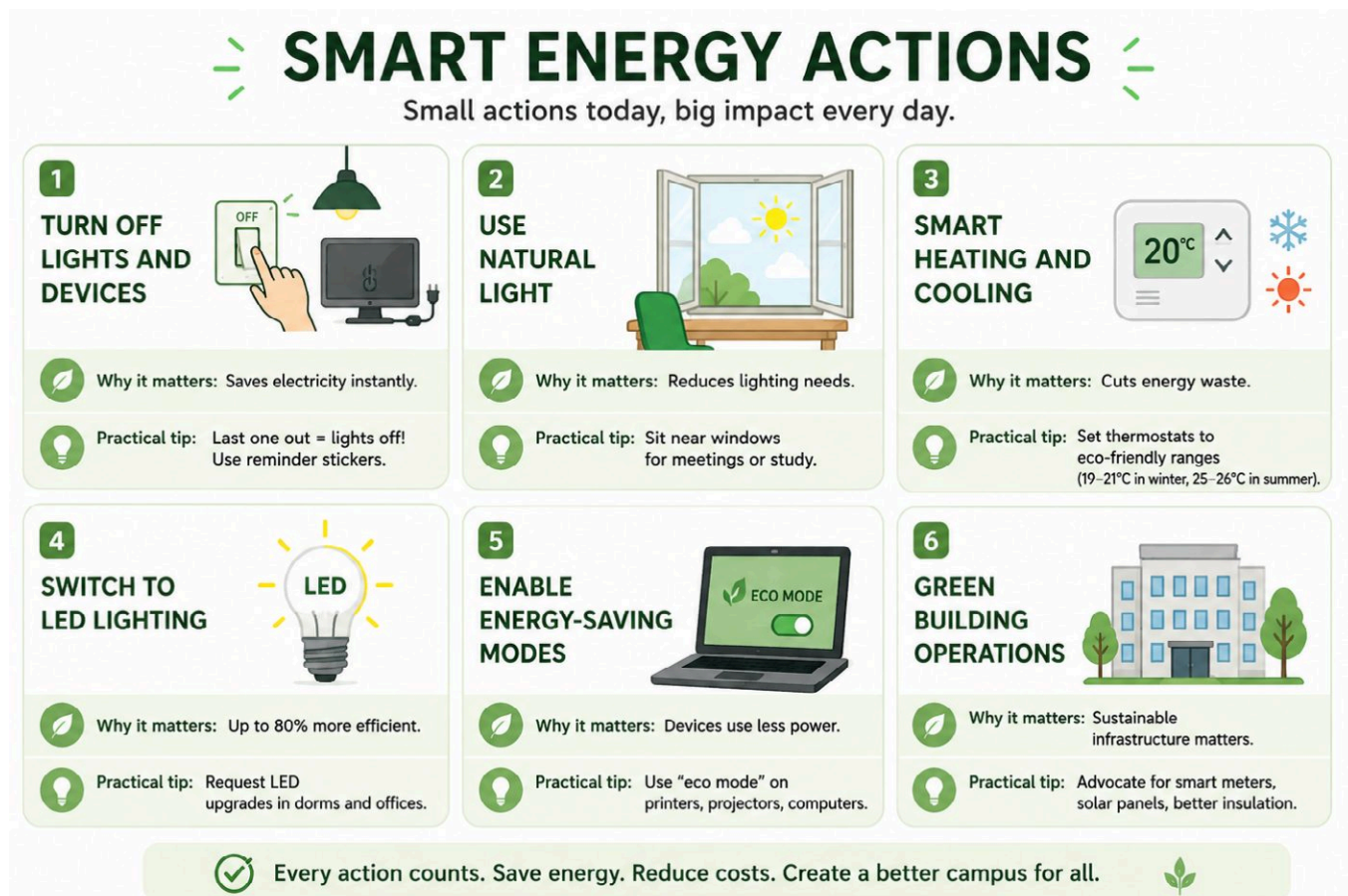


Fig 5: Smart Energy Actions for a Sustainable Campus

Electronic forms and document workflows

They replace paper applications and forms. The system automatically routes documents to the right people, monitors status, and eliminates errors.

The result? Less paper, faster service, and more transparent processes.

2.6 Resource Management and Materials

Efficient resource management and smart selection of building materials are today one of the pillars of sustainable development at universities. On campuses where thousands of people pass through every day, proper management of water, waste, and materials not only reduces costs but also genuinely decreases the environmental impact of buildings. Modern solutions include both resource-saving technologies and actions that engage the entire academic community.

Water efficiency — recovery, retention, and intelligent irrigation

In modern university buildings, grey-water recovery systems are increasingly used. After treatment, this water can be used for flushing toilets, cleaning surfaces, or watering greenery. Large facilities such as sports halls or libraries are also well-suited for collecting rainwater. Rainwater flows into retention tanks and can be used during dry periods, reducing drinking water consumption and relieving the sewage system.



Waste management — segregation, education, and intelligent bins

Campuses generate a large variety of waste, which makes proper management essential. Modern universities focus on:

- clear labeling of containers,
- segregation points in strategic locations,
- education for students and staff.

Intelligent bins with fill-level sensors are also increasingly used; they notify when they need emptying. This makes waste collection cheaper and more efficient. In laboratories, additional systems for safe management of specialised waste are implemented.

Building materials — durable, energy-efficient, and environmentally friendly

Modern university buildings use materials that:

- insulate heat well,
- have a low carbon footprint,
- are durable and safe for health (Ghaffarianhoseini et. al. 2013).

In lecture halls and offices, low-VOC materials are used, which improve air quality and user comfort.

Buildings designed with the future in mind

Modern campuses are built to be easy to modernise. They use:

- modular partition walls,
- raised floors,
- structures that allow easy replacement of installations.

Thanks to this, the university can quickly adapt spaces to new needs and reduce the amount of construction waste.



Replacing equipment with energy-efficient devices — a quick way to achieve major savings

One of the simplest and most cost-effective actions is replacing old equipment with A+++-class devices. Modern devices consume less energy and often have intelligent functions that automatically adjust their operation to user needs (Commission Regulation 2019).

This applies to:

- HVAC systems,
- office equipment,
- laboratory equipment,
- devices in social areas.

IT equipment:

- low-energy LED monitors,
- “energy-efficient” laptops,
- energy-efficient servers and SSD arrays,
- printers with ultra-economy mode.

Common areas:

- A+++ refrigerators, dishwashers, coffee machines,
- faucets with flow restrictors,
- energy-efficient hand dryers,
- elevators with energy-recovery systems.

Reference to Energy Standards

In recent years, regulations have become much stricter, which means that universities must design and modernise their facilities so that they use as little energy from fossil fuels as possible. In practice, this means the necessity of using:

- low-emission technologies,
- renewable energy sources,
- advanced building automation that optimises the operation of installations.



Energy Standard 2026 — new energy classes A+ to G

A new building rating system will soon come into force. Energy classes from A+ to G will appear, similar to household appliances. For new and modernised public buildings — including universities — classes A or A+ will be mandatory.

- **Class A** means a building with very low energy demand, equipped with renewable energy sources and heat-recovery systems.
- **Class A+** is a zero-emission standard — the building produces more energy than it consumes over the course of a year.

To implement these classes, the university must integrate multiple technologies: photovoltaics, energy storage, heat pumps, heat recovery, intelligent lighting, EMS, and BMS.

Modern technologies and legal requirements

Solutions such as:

- BMS,
- intelligent lighting,
- heat recovery,
- automatic shading,
- renewable energy installations,

help increase the share of renewable energy in the building. Thanks to this, the university not only meets current regulations but also prepares for even more demanding standards that will soon become the norm.

Benefits for the university — not only formal

Adapting buildings to the new energy standards is not only an obligation but also a real benefit. Lower energy consumption means lower operating costs, and a high energy class increases the value of buildings and strengthens the university's image as a modern and responsible institution.

As a result, investments in energy-efficient technologies become part of the development strategy — helping the university become more competitive, ecological, and prepared for the future.

Statistics:



Quotes:

“Energy efficiency begins with data. What we do not measure, we cannot improve.”

“Digital processes not only speed up work — they eliminate thousands of unnecessary printouts every year.”

“Technology in a lecture hall should be invisible, yet noticeable — in air quality, lighting, and comfort.”

“Every kilowatt-hour saved is real money that can be invested in improving teaching.”

2.7 Quick wins

✓ Conduct a comprehensive review of campus energy performance using available monitoring and operational data.

✓ Identify and prioritise the key sources of energy consumption across buildings and digital infrastructure.

✓ Introduce a unified framework for energy monitoring and reporting using existing building-use patterns.

✓ Align building operation schedules with actual occupancy and functional needs.

✓ Strengthen digital sustainability practices by standardising energy-saving settings across devices and workspaces.

2.8 Reference list:

1. Boyce, P. R. (2014). *Human factors in lighting*. CRC Press.
2. Commission Regulation (EU) 2019/2021 of 1 October 2019 laying down ecodesign requirements for electronic displays pursuant to Directive 2009/125/EC of the European Parliament and of the Council, amending Commission Regulation (EC) No 1275/2008 and repealing Commission Regulation (EC) No 642/2009. (2019). *Official Journal of the European Union*, L 315, 241–262.
3. Fisk, W. J. (2017). *The ventilation problem in schools: literature review*. *Indoor Air*, 27(6), 1039–1051.
4. Ghaffarianhoseini, A., Dahlan, N. D., Berardi, U., & Ghaffarianhoseini, A. (2013). *Sustainable energy performances of green buildings: A review of current theories, implementations and challenges*. *Renewable and Sustainable Energy Reviews*, 25, 1–17.
5. Gomes, J. (2023). *Digital transformation in public administration*. In *Intersecting environmental social governance and AI for business sustainability* (pp. 289–315). IGI Global.
6. Hong, T., Yan, D., D’Oca, S., & Chen, C. (2017). *Ten questions concerning occupant behavior in buildings: The big picture*. *Building and Environment*, 114, 518–530.
7. Luo, N., Wang, Z., Blum, D., Weyandt, C., Bourassa, N., Piette, M. A., & Hong, T. (2022). *A three-year dataset supporting research on building energy management and occupancy analytics*. *Scientific Data*, 9, Article 156
8. Luthander, R., Widén, J., Nilsson, D., & Palm, J. (2015). *Photovoltaic self-consumption in buildings: A review*. *Applied Energy*, 142, 80–94.
9. Messerve, T., Pietrobon, M., Cifariello, L., Lodigiani, A., & Gruber, M. (2024). *Results from the application of smart-ready technologies: Real-life application of artificial intelligence building service technology to HVAC systems in a medium-scale pilot building in Italy*. *REHVA Journal*, 05/2024, 46–51.
10. O’Neill, Z., Narayanan, S., & Brahme, R. (2019). *Model-based real-time whole building energy performance monitoring and diagnostics*. *Energy and Buildings*, 199, 519–533.
11. Parra, D., Swierczynski, M., Stroe, D. I., Norman, S. A., Abdon, A., Worlitschek, J., O’Doherty, T., Rodrigues, L., Gillott, M., Zhang, X., Bauer, C., & Patel, M. K. (2017). *An interdisciplinary review of energy storage for communities: Challenges and perspectives*. *Renewable and Sustainable Energy Reviews*, 79, 730–749.
12. Satish, U., Mendell, M. J., Shekhar, K., Hotchi, T., Sullivan, D., Streufert, S., & Fisk, W. J. (2012). *Is CO₂ an indoor pollutant? Direct effects of low-to-moderate CO₂ concentrations on human decision-making performance*. *Environmental Health Perspectives*, 120(12), 1671–1677.
13. Shehabi, A., Smith, S., Sartor, D., Brown, R., Herrlin, M., Koomey, J., Masanet, E., Horner, N., Azevedo, I., & Lintner, W. (2016). *United States data center energy usage report* (LBNL 1005775). Lawrence Berkeley National Laboratory.
14. Srivastava, R. (2025). *Unlocking energy savings using building energy management control systems*. American Council for an Energy-Efficient Economy (ACEEE). Prepared for the Industrial Technology Research Institute, Taiwan. Energy Administration, Taiwan [https://www.aceee.org/sites/default/files/pdfs/unlocking_energy_savings_using_building_energy_management_control_systems.pdf]
15. University of California, Davis Energy Conservation Office. (2021). *Annual energy report*. University of California, Davis.
16. University of Reading. (2020). *Sustainability report*. University of Reading.
17. Zhang, H., Arens, E., Kim D. E., Buchberger E., Bauman F., Huizenga C. (2010). *Comfort, perceived air quality, and work performance in a low-power task–ambient conditioning system*. *Building and Environment*, 45(1), 29–39.



3 Circular Resources: Waste, Water and Materials

3.1 Introduction

Universities operate like small cities: they generate significant volumes of waste, consume water, and procure materials that affect both the environment and the institutional operating costs.

A recent review of waste management in Higher Education Institutions (HEIs) reports an average waste generation rate of 0.19 kg per person per day, with significant variation depending on campus size and activities. This highlights both the scale of the challenge and the potential for targeted interventions (Zamri et al., 2024).



Transitioning to circular resource management reduces waste streams, lowers resource consumption, saves money and strengthens the university's teaching, research and community mission. Practical measures, from source-separated collection and sustainable procurement to repair hubs and smart water metering, turn the campus into a functioning living lab for sustainable innovation and behaviour change.

Circular approaches deliver clear environmental and financial benefits by cutting disposal costs and reducing demand for virgin materials, which in turn lowers pollution and slows resource depletion. Establishing baseline material-flow audits and running targeted pilots builds operational resilience by revealing where resources are lost, enabling measurable improvements and providing the evidence needed to scale successful interventions. At the same time, campus-level circular projects offer strong educational value, creating hands-on learning and research opportunities that integrate teaching with practice and give students and staff direct experience of real-world sustainability solutions.

This chapter provides practical, actionable guidance across three linked areas. First, the chapter addresses infrastructure, explaining how to design and site waste-sorting stations, refill points and repair hubs to maximise accessibility, efficiency and user compliance. Second, it focuses on people and behaviour, offering practical guidance on zero-waste office rules, onboarding and training modules, reuse campaigns and incentive schemes that change everyday practice. Third, it presents implementation tools and monitoring: short case studies, an implementation checklist (audit, run a pilot, monitor results, scale up) and suggested Key Performance Indicators (KPIs) to measure progress and support scaling.

The emphasis for staff and leadership is simple. Start with small, measurable pilots that deliver quick wins, measure baseline conditions and progress, and engage the whole campus community, students, academic staff and facilities teams, to embed circular practices into daily operations. This chapter equips you with the guidance and tools to begin that transition now!

3.2 Infrastructure

The goal is to create infrastructure that is visible, accessible and easy to use so participation is maximised and contamination of recycling streams is minimised (Figure 1). Reliable data should then be produced to support continuous improvement. Design decisions should be data-driven: conduct a baseline audit, test layouts and procedures with time-limited pilots, and refine before scaling campus-wide.



Agricultural University of Athens (AUA) invites the staff and student community to actively participate in recycling actions it supports (Source: Agricultural University of Athens, Recycling Programme)

Waste-sorting stations should be placed at high-traffic locations, such as building entrances, cafeterias, libraries, lecture halls and central plazas, prioritising areas with both high footfall and dwell time.

Each station must provide separate containers for organics, paper and cardboard, plastics, glass and metals, plus a clearly marked stream for special wastes such as batteries and e-waste. Signage must be highly visual and user-centred, using large pictorial labels, consistent colour coding across the campus, short three-line instructions and QR codes linking to more detail. Multilingual labels should be used where appropriate. Arrange bins to follow natural user movement. For example, exits from dining areas should lead directly to the sorting station to avoid congestion and ensure stations do not block walkways. Maintenance requirements must be explicit: daily emptying for high-use sites, weekly cleaning and monthly inspections for damage and wear.

Campus waste audits consistently show that a large proportion of waste remains incorrectly sorted. In some cases, more than 50% of materials disposed of as general waste could have been recycled or composted, underlining the importance of clear signage and user guidance.

(Smyth et al., 2010).



Refill points and drinking water stations should be installed near libraries, lecture theatres, dining areas and student service buildings to reduce single-use plastics. Technical specifications must ensure a certified potable water supply, appropriate filtration where required, backflow prevention and easy access for maintenance. Hygiene and safety protocols should be defined, including daily cleaning routines, visible hygiene instructions and a named maintenance owner. User-centred design matters: spouts and heights should allow easy bottle filling, signage should explain use and hygiene, and a small on-site store of spare parts should be kept for rapid repairs.

Repair hubs and reuse centres should offer basic repair services for electronics, textiles and small furniture, provide assessment for reuse, and host parts exchanges and upcycling workshops. This infrastructure should be staffed by a part-time hub coordinator supported by trained volunteers or student interns. It should offer scheduled drop-in hours and run one to two workshops each month. Intake must be simple and transparent: an intake form that captures item details, fault, estimated time and cost, and a tracking ID for each item. Display anonymised success metrics to build trust and encourage participation. Wherever possible, integrate the hub with academic programmes in engineering, design and sustainability to provide practical learning and research opportunities.

Smart metering and data capture are essential. Key metrics to collect include weight by stream (kg/week), recycling rate (%), contamination rate (%), litres of water per person per day and repaired items per month. Equip sites with portable scales for stations, fixed water meters at refill points and barcode or QR tracking for repair items. Use simple dashboards to provide weekly summaries for pilot sites and monthly reports for leadership. Allow users to download the raw data as a spreadsheet (for example, an Excel file) and include basic charts that show trends over time. Configure alerts for threshold breaches (eg. contamination above 15%) so teams can respond quickly.

Special streams and hazardous materials require dedicated handling. Laboratory and chemical wastes need secure containment, appropriate packaging and documented handover procedures; coordination with campus safety officers and certified contractors is mandatory. E-waste and batteries should be collected periodically through certified recyclers, with records maintained of volumes and destinations. Ensure all activities comply with local and national regulations and that staff receive training in safe handling and transfer documentation.

Evidence from campus pilots indicates that well-designed interventions can lead to measurable improvements within a short period. In several cases, waste audits have shown that over 70% of campus waste could be diverted from landfill through a combination of recycling, composting and reuse strategies. (Smyth et al., 2010).

For pilots, adopt a three-month timeline:



Month 0	 Conduct a baseline audit in one library and one dining hall
Month 1	 Install sorting stations and a refill point. Launch an awareness campaign
Month 2	 Collect weekly data and make operational adjustments
Month 3	 Evaluate results and decide on scaling

Define clear roles and targets before scaling: appoint a senior sponsor, a project lead, a facilities coordinator, a communications lead, an academic partner and a student liaison. Set primary KPIs such as kg waste per person per week, percentage recycled, contamination rate, litres of water per person per day and repaired items per month. Pilot targets might include a 10–20% reduction in waste at pilot sites and contamination below 15%.

Essential equipment:

- fixed sorting stations with compartmentalised bins for organics, paper/cardboard, plastics, glass and metals,
- portable weighing scales for station-level measurements,
- refill station units with certified filters and backflow prevention,
- basic repair tools and benches for repair hubs,
- qr/barcode labels for item and bin tracking,
- dashboard or spreadsheet template for monitoring and reporting.

Before rollout (next steps):

- complete baseline audit at selected pilot locations,
- select pilot sites and confirm stakeholders and site owners,
- procure and install the equipment listed above,
- finalize maintenance responsibilities and name maintenance owners,
- run awareness and training campaigns for staff, volunteers and users,
- begin regular measurements and weekly reporting via dashboards or spreadsheets,
- evaluate pilot outcomes against KPIs and targets,
- prepare scale-up plan updating procurement rules, budgets and training materials.

3.3 People and behaviour change

Circular resource management becomes truly effective only when it is supported by everyday behavioural shifts across the university community. Infrastructure provides the foundation, but people determine whether systems work as intended. Successful Higher Education Institutions (HEIs) combine clear guidance, visible cues, positive incentives, and continuous feedback to build a culture in which circular practices become the norm rather than the exception. Staff, students and facilities teams must be engaged as co-creators of solutions, not just as passive users.

Zero-Waste Office Practices

Administrative and academic units can significantly reduce waste by adopting a simple “zero-waste office toolkit” that standardises daily routines, including:

- shared printers set to double-sided, black-and-white printing by default,
- reusable office supplies, such as refillable pens, reusable folders and durable storage boxes,
- minimised single-use items in meetings and events (no disposable cups, cutlery or plastic bottles),
- clear desk and sorting areas with consistent colour-coded signage for recycling and organics.

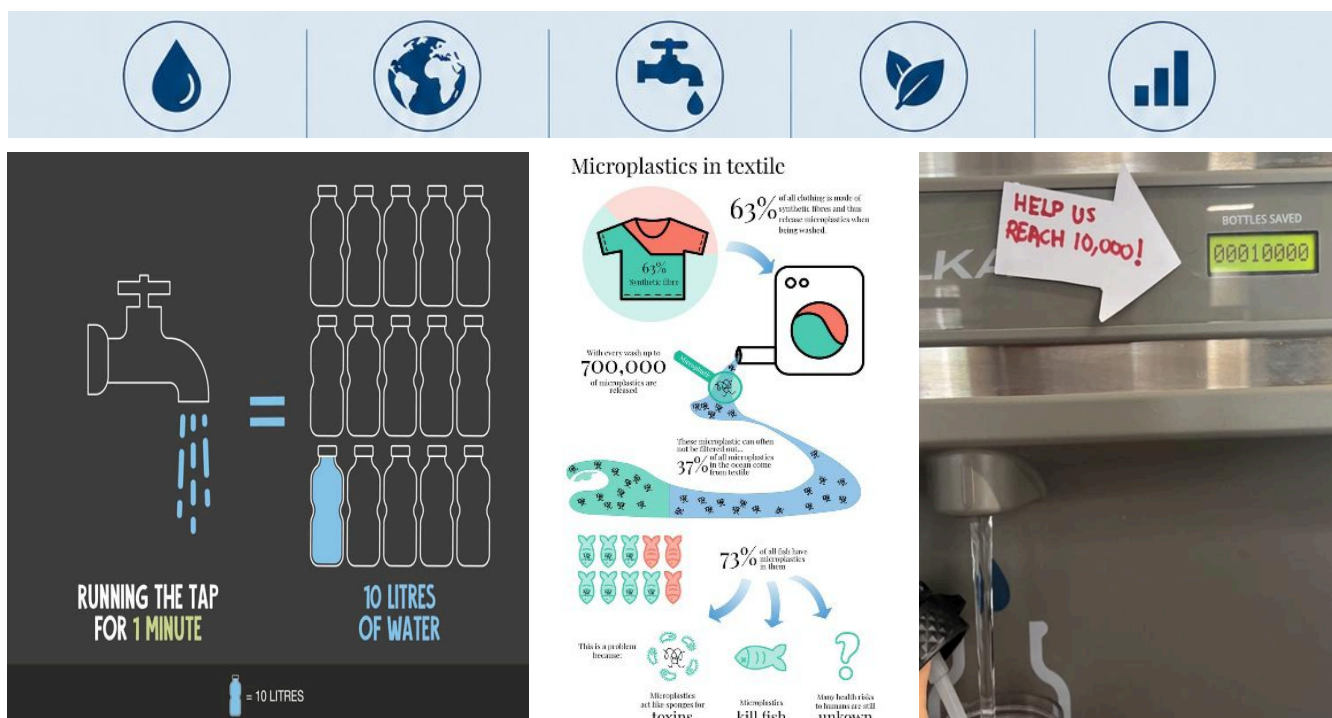
These practices can reduce mixed waste volumes, cut procurement costs and reinforce a culture of responsibility.

Water Awareness and Blue Literacy

Water consumption and pollution are often overlooked in campus sustainability strategies. Behaviour-change initiatives can strengthen awareness and reduce unnecessary use:

- short “blue facts” displayed on screens, refill stations and restrooms (e.g., “a running tap uses 12–15 litres per minute”),
- training for cleaning and maintenance staff on efficient water use and non-toxic cleaning products (figure 2),
- microplastics awareness sessions explaining how clothing, laundry habits and laboratory practices affect water quality,
- visible refill-station counters showing litres saved compared to bottled water.

These interventions help staff understand the environmental impact of their daily routines and encourage them to be more mindful of water use.



Examples for everyday life interventions to be implemented in a Campus

Onboarding and Training Modules

Embedding circularity into institutional culture requires structured learning opportunities:

- mandatory onboarding modules for new staff and student assistants covering waste sorting, refill station use, microplastics prevention and responsible procurement,
 - short e-learning courses on circular economy principles tailored to administrative, academic and technical staff,
 - department-level briefings at the start of each semester to reinforce expectations and highlight updates,
 - peer-to-peer learning through sustainability champions who support colleagues in adopting new practices.
- Regular training ensures that circular practices are understood, consistent and sustained over time.

Reuse Campaigns and Community Engagement

Behaviour change accelerates when the campus community participates in visible, hands-on initiatives:

- swap events for books, lab equipment, office supplies and clothing (figure 3),
- “reuse campus week” where departments exchange unused items before purchasing new ones,
- repair-hub workshops teaching basic repair skills for electronics, textiles and furniture,
- competitions and challenges (e.g., “zero-waste office of the month”).

These activities normalise reuse, reduce procurement needs and strengthen community engagement.



Example of laboratorial glassware exchange (Source: Lab Manager 2026)

Incentives and Feedback Loops

Positive reinforcement is essential for long-term behaviour change:

- recognition schemes for departments achieving high recycling rates or low contamination,
- small rewards (e.g., reusable bottles, vouchers) for participation in reuse or repair initiatives,
- real-time dashboards showing waste, recycling and water-use trends by building,
- feedback campaigns that highlight progress (“your building reduced mixed waste by 18% this month”).

When staff see the impact of their actions, participation increases, and circular practices become embedded in daily routines.



3.4 Implementation Tools and Monitoring

Effective circular resource management in HEIs requires more than infrastructure and behavioural change. It depends on structured implementation processes, measurable performance indicators and continuous feedback loops that enable institutions to test, refine and scale interventions over time. This section provides a practical framework that combines operational tools with strategic monitoring to ensure long-term impact.

Implementation Checklist

A structured, step-by-step approach supports efficient deployment and reduces the risk of ineffective or fragmented interventions. HEIs are encouraged to follow a four-phase implementation cycle:

1. Baseline Assessment

Conduct a material and water flow audit to identify current waste streams, consumption patterns and inefficiencies. This includes measuring waste generation per building or department, identifying contamination rates and assessing water use intensity.

2. Pilot Implementation

Select representative pilot sites (e.g. one academic building and one dining facility) and introduce targeted interventions such as sorting stations, refill points or reuse schemes. Pilot duration should typically range from 8 to 12 weeks to ensure sufficient data collection.

3. Monitoring and Adjustment

Collect data on a weekly basis and assess performance against predefined KPIs. Identify operational challenges such as contamination, low participation or maintenance gaps, and implement corrective actions in real time.

4. Scaling and Integration

Expand successful interventions across additional campus areas, embedding them into institutional procedures, procurement policies and daily operations. Scaling decisions should be based on measurable performance improvements and stakeholder acceptance.

Key Performance Indicators (KPIs)

To ensure comparability and consistency, KPIs should be clearly defined, measurable and aligned with institutional sustainability goals. Indicative categories should include:

Waste Management 	Recycling rate	%
	Contamination rate in recycling streams	%
	Volume of waste diverted from landfill	kg or %
Water Management 	Water consumption per capita	litres/person/day
	Reduction in bottled water usage	%
	Number of refill station uses	daily/weekly
Reuse & Circularity 	Number of items repaired or reused	Monthly
	Participation rate in reuse initiatives	%
	Reduction in procurement of single-use materials	%

KPIs should be reviewed periodically and adapted to reflect institutional priorities and local conditions.

Monitoring Tools and Data Systems

Reliable data collection and transparent reporting are essential for continuous improvement. HEIs should implement simple but robust monitoring systems that combine digital tools with operational tracking:

- Data collection tools: portable weighing scales, smart water meters, QR or barcode systems for tracking repair and reuse activities.
- Digital dashboards: user-friendly platforms that provide real-time or weekly summaries of key metrics, accessible to both operational teams and decision-makers.
- Reporting frequency: weekly monitoring at the pilot level and monthly reporting for institutional leadership.
- Data transparency: sharing selected data with the campus community (e.g. through dashboards or visual displays) to increase awareness and engagement.

Where possible, systems should allow data export (e.g. Excel format) to support further analysis and integration into institutional reporting frameworks.

Feedback Loops and Continuous Improvement

Circular systems require iterative refinement. Monitoring should not be limited to data collection but should actively inform decision-making processes:

- Establish regular review meetings (e.g. monthly) involving facilities teams, academic staff and student representatives.
- Identify trends and anomalies (e.g. increased contamination rates) and respond with targeted interventions such as additional signage or training.
- Use pilot results to adjust infrastructure design, communication strategies and operational procedures.

This iterative approach ensures that solutions remain adaptive and responsive to user behaviour and institutional needs.

Scaling Strategy and Institutional Integration

Scaling successful interventions requires a transition from pilot initiatives to institutional systems. Key considerations include:

- Governance: assign clear responsibilities (e.g. sustainability office, facilities management, academic partners).
- Standardisation: develop campus-wide guidelines for infrastructure design, signage and operational procedures.
- Procurement alignment: integrate circular criteria into purchasing policies to ensure long-term consistency.
- Capacity building: provide ongoing training for staff and students to support the adoption of the system.

Scaling should be gradual and evidence-based, prioritising high-impact areas and leveraging early successes to build institutional momentum.

A structured implementation and monitoring framework transforms circular resource management from isolated initiatives into a coherent institutional system. By combining pilot-based learning, measurable KPIs and continuous feedback, HEIs can achieve scalable, data-driven improvements that support both environmental performance and educational outcomes.



3.5 Case Studies

Below are two case studies from the Agricultural University of Athens that illustrate how circular resource management principles can be translated into concrete, operational solutions. These examples demonstrate how targeted interventions—supported by clear procedures, certified partners and systematic monitoring—can deliver measurable environmental and financial benefits while strengthening institutional capacity for long-term circularity.

Case Study 1 Integrated Recycling System for Special Waste Streams

The Agricultural University of Athens has developed a structured and multi-stream recycling system in collaboration with licensed external partners, enabling the safe and efficient management of specialised waste categories generated across campus operations.

The system covers a wide range of materials, including electrical and electronic equipment, lamps, batteries and printer consumables, ensuring that hazardous and non-standard waste streams are handled through certified recycling schemes. Dedicated collection infrastructure has been installed across the campus, including:



5 COLLECTION BINS
for electrical
devices



7 COLLECTION BOXES
for lamps



7 COLLECTION POINTS
for portable batteries



7 COLLECTION POINTS
for printer cartridges

All materials are periodically collected by authorised personnel and processed according to environmental regulations.



Multi-stream Recycling System (Source: Electrocycle 2026)

Case Study 2 Metal Waste Recovery and Resource Valorisation

In addition to specialised waste streams, the university has implemented a targeted system for the collection and recovery of metal waste generated by campus activities, infrastructure maintenance, and obsolete equipment.

Through collaboration with a licensed recycling contractor, university staff identify and report unused or obsolete metal items found both indoors and outdoors. These materials are systematically collected and removed by the contractor, ensuring safe handling and efficient recovery.

Impact and Results:



Approximately **11 tonnes** of metal waste removed within a 12-month period



Generation of direct financial return for the university through material recovery

Beyond waste reduction, this initiative demonstrates how circular practices can generate economic value, transforming waste streams into resources while improving campus safety and organisation.



METAL WASTE



RECOVERY & PROCESSING



VALUABLE RESOURCES



Collection and recovery of metal waste (Source: Mathioudakimetals 2026)

3.6 Conclusions

Circular resource management is not a standalone initiative but a foundational pillar of a sustainable campus ecosystem. By combining infrastructure, behaviour change and structured monitoring, universities can transform everyday operations into living laboratories of circular innovation. The practices and tools outlined in this chapter provide a practical roadmap for reducing waste, conserving water and extending the life of materials, while simultaneously enriching teaching, research and community engagement. With these systems in place, the next step is to broaden the lens from resource flows to the wider campus environment, exploring how green spaces, biodiversity, mobility and daily living practices shape a truly Green Campus and Sustainable Living culture.

3.7 Quick wins



Install clearly labelled recycling stations in one high-traffic building.



Introduce reusable bottle refill stations and promote their use.



Launch a one-week “ReUse Campus Week” for exchanging office supplies and equipment.



Create a “Zero-Waste Office Challenge” between departments.



Place water-saving and waste-reduction awareness messages in restrooms and common areas.

3.8 Reference list

1. Agricultural University of Athens. 2026. Website. <https://www2.aua.gr/el>
2. Electrocycle. 2026. Website. <https://www.electrocycle.gr/>
3. European Commission. (2020). A new Circular Economy Action Plan: For a cleaner and more competitive Europe. European Commission. European Commission Circular Economy Action Plan
4. Lab Manager. 2026. Website. <https://www.labmanager.com>
5. Mathioudakimetals. 2026. Website. <https://www.mathioudakimetals.gr/>
6. Smyth, D. P., Fredeen, A. L., & Booth, A. L. (2010). Reducing solid waste in higher education: The first step towards “greening” a university campus. *Resources, Conservation and Recycling*, 54(11), 1007–1016. <https://doi.org/10.1016/j.resconrec.2010.02.008>
7. Zamri, M. F. M. A., et al. (2024). A review of waste management in higher education institutions: The road to zero waste and sustainability. Retrieved from ResearchGate Publication



4 Smart Mobility and Sustainable Travel

Why Mobility Matters in Sustainable Universities

Mobility is one of the largest contributors to university-related carbon emissions. Together, daily commuting by staff and students, business travel, logistics, and campus transport can account for around 30% of total institutional emissions (Helmets et al., 2021). Universities that aim to transition to climate-aware operations must therefore rethink how their communities move, travel, and interact.

Sustainable mobility in higher education is more than transport - it is a shift in culture, infrastructure, and behaviour. Smart mobility strategies reduce emissions, improve air quality and health, reduce congestion, and make universities more attractive, modern, and future-ready.

This chapter explores solutions that universities can implement to support more sustainable mobility pathways for their staff, students, and visitors. It combines infrastructure redesign, behavioural incentives, digitalisation, and organisational policies that collectively shape greener travel patterns.

4.1 Developing a Smart and Sustainable Mobility System in a University Campus

4.1.1 Rethinking Campus Infrastructure

Effective sustainable mobility starts with a campus environment that supports low-carbon travel choices. Universities can significantly influence behaviour by improving physical infrastructure that makes walking, cycling, and public transport safer, easier, and more attractive.

Key infrastructure actions include:

a. Safe Cycling, Walking Infrastructure, and Universal Accessibility (within and around the campus)

- Dedicated cycling lanes connected to local urban networks
- Secure and weather-protected bicycle parking
- Repair stations and accessible pump points
- Showers, changing rooms, and lockers to support cyclists
- Improved lighting and pedestrian-safe crossings
- Parking spaces for users with mobility constraints
- Infrastructure for universal access to the campus and to buildings

Safe active-mobility infrastructure reduces staff reliance on cars and encourages healthier routines. Universities that upgraded cycling routes often saw a great increase in bicycle commuting.



b. Electric Mobility Infrastructure

- Installation of electric-vehicle (EV) charging points in staff and visitor parking areas
- Preferential parking for electric vehicles and shared rides
- Transitioning university fleet vehicles to electric models

EV charging availability is a strong driver of staff transition toward electric cars, particularly in regions with limited public infrastructure.

c. Integrated Campus Transport Solutions

- Campus shuttle buses connecting university buildings with public transport hubs
- Demand-responsive mini-shuttles for underserved or rural campus areas
- Real-time shuttle information through mobile applications

Integrating campus shuttles with urban mobility creates a seamless multimodal experience, making public transport more convenient than driving a personal car.

d. Shared Mobility and Carpooling Services

- Digital carpooling platform for staff and students
- Priority parking for shared vehicles
- Internal “Green Ride Day” to promote shared commuting

Digitalisation enables efficient matching of travel routes and schedules, strengthening social connections and cutting single-occupancy trips.

e. Reducing Travel Through Digital Technologies

- Promoting virtual conferencing systems
- Equipping meeting rooms with hybrid-meeting technologies
- Encouraging remote participation for non-essential travel

Virtual-first policies can reduce travel emissions by up to 90%, without compromising productivity (Tao et al., 2021).

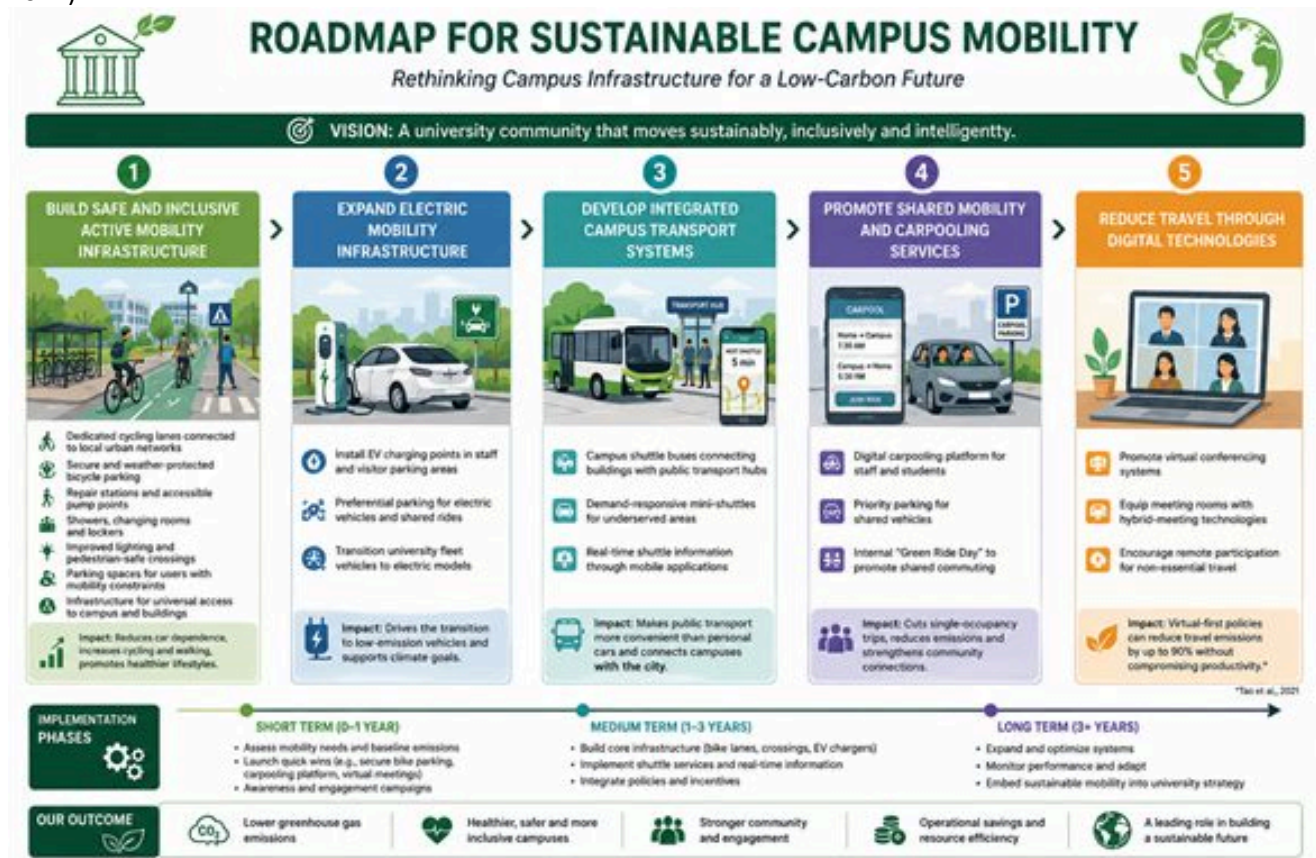


Fig 1: Roadmap for sustainable campus mobility

4.1.2 Supporting People: Policy, Incentives, and Behavioural Shifts

Infrastructure alone is not enough - long-term change depends on staff engagement, awareness, and institutional support.

a. Institutional Policies for Sustainable Travel

Universities can integrate mobility considerations into their strategic sustainability frameworks. Strong policies guide behaviour and create shared responsibility.

Key components include:

- **Virtual-first policy:** digital meetings replace travel whenever possible
- **Train-before-plane rule:** staff must choose rail for trips under a set duration (e.g., under 6 hours)
- **Work-from-home guidelines** reducing commuting
- **Sustainable travel rules for conferences, fieldwork, and administrative trips**
- **Green procurement guidelines** for fleet vehicles and logistics services

These policies encourage conscious decision-making and ensure carbon reductions become embedded in daily operations.



SUSTAINABLE MOBILITY

Checklist

FOR UNIVERSITY STAFF

Small choices. Big impact. Together.

Our mobility choices today shape our sustainable tomorrow.

I support our policies!

1 INSTITUTIONAL POLICIES FOR SUSTAINABLE TRAVEL

Strong policies guide behaviour and create shared responsibility.

- ☐ I follow the Virtual-first policy: digital meetings replace travel when possible.
- ☐ I choose Train-before-plane: I take the train for trips under 6 hours.
- ☐ I follow Work-from-home guidelines to reduce commuting.
- ☐ I follow Sustainable travel rules for conferences, fieldwork, and official trips.
- ☐ I support Green procurement guidelines for fleet vehicles and logistics services.

WHY IT MATTERS

These policies embed carbon reductions into our daily work.

b. Incentives That Encourage Greener Choices

Behavioural incentives often achieve significant impact at low cost. Examples include:

- **Public transport subsidies** or university-sponsored mobility cards
- **Cycling bonuses**, reimbursements for bike maintenance, or mileage incentives
- **Reduced parking fees for carpoolers**
- **Flexible working hours** to avoid peak-traffic congestion
- **Recognition programs** (e.g., “Green Commuter of the Month”)

Well-designed incentives can shift commuting patterns quickly. The introduction of free or discounted transit passes can lead to a significant **increase in public transport use**.

**2**

INCENTIVES THAT ENCOURAGE GREENER CHOICES

Small rewards can drive big changes.

☐		I use public transport and benefit from subsidies or mobility cards.
☐		I cycle or walk and use bonuses, bike maintenance reimbursements, or mileage incentives.
☐		I carpool and enjoy reduced parking fees.
☐		I use flexible working hours to avoid peak-traffic congestion.
☐		I participate in recognition programs (e.g., “Green Commuter of the Month”).

*Good for me,
good for the planet!*

DID YOU KNOW?



Free or discounted transit passes can lead to a significant increase in public transport use.

c. Awareness and Education

Developing a sustainability-driven mobility culture begins with awareness and shared responsibility.

Strategies include:

- Mobility sessions during staff onboarding
- Professional development workshops on sustainable travel
- Campus-wide “Sustainable Mobility Week” events
- Visual prompts and signage encouraging active mobility
- Competitions, challenges, and reward campaigns

A well-informed campus community is more likely to support and adopt low-emission commuting habits.

**3**

AWARENESS & EDUCATION

Build a culture. Inspire change.

☐		I attend mobility sessions during staff onboarding.
☐		I join professional development workshops on sustainable travel.
☐		I participate in campus-wide “Sustainable Mobility Week” events.
☐		I look for visual prompts and signage that encourage active mobility.
☐		I take part in competitions, challenges, and reward campaigns.

Awareness leads to action!

TOGETHER, WE CAN...



create a healthier campus, reduce emissions, and lead by example.

Start today! 

Every sustainable choice you make matters.



Walk more



Cycle smart



Share rides



Meet virtually



Think sustainably

SUSTAINABLE MOBILITY. STRONGER COMMUNITIES. BETTER FUTURE. 

4.2 Smart Mobility in Motion: Best Practices in Higher Education

4.2.1 A pedestrian-bicycle route with limited car traffic in relation to the Main Building - Novum Auditorium, Gdańsk University of Technology, Poland (U-Mob Project., 2018)

The Gdańsk University of Technology implemented a major reconstruction of the road and square between its Main Building and the Novum Auditorium as part of a broader campus development plan.

The project aimed to significantly reduce car traffic in the historic campus area and create a modern, pedestrian- and cyclist-friendly environment that still harmonises with the site's architectural heritage.

The redesigned space features:



New granite paving



Illuminated seating



Dedicated bicycle-friendly areas



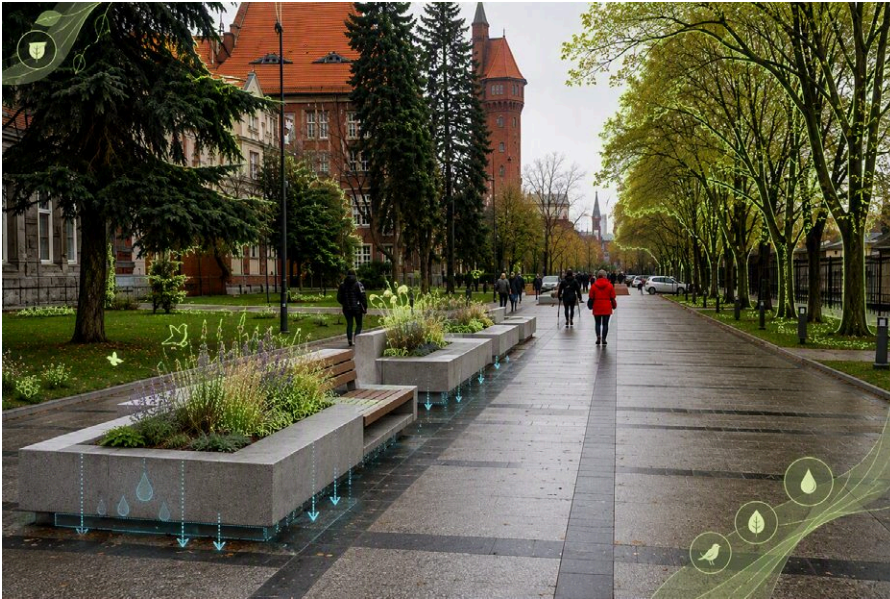
Strategically arranged parking spaces located outside the central pedestrian zone

Enhanced lighting from ground floodlights further highlights the campus buildings and improves safety after dark. The modernisation allows for more comfortable movement between key facilities, provides safe designated parking, and increases opportunities for rest thanks to additional benches.

Key indicators of success include reduced car presence in the central area and increased use of walking and cycling infrastructure, especially the covered bicycle parking facilities. The initiative improved mobility on campus by allowing people to move freely between the Main Building and the Auditorium Novum. It also provided safe, designated parking spaces for cars, making access more convenient for drivers. Additionally, the increased number of benches created more opportunities for students and staff to rest and relax between classes. Images from the Gdańsk University of Technology are shown below.



Concrete, backlit seats with a granite-like cover, along the illuminated zone (Source: U-Mob Project, 2018)



A view of the whole road to Novum, with benches (Source: U-Mob Project, 2018)



The end of the car-free zone, separated by traffic cones (Source: U-Mob Project, 2018)



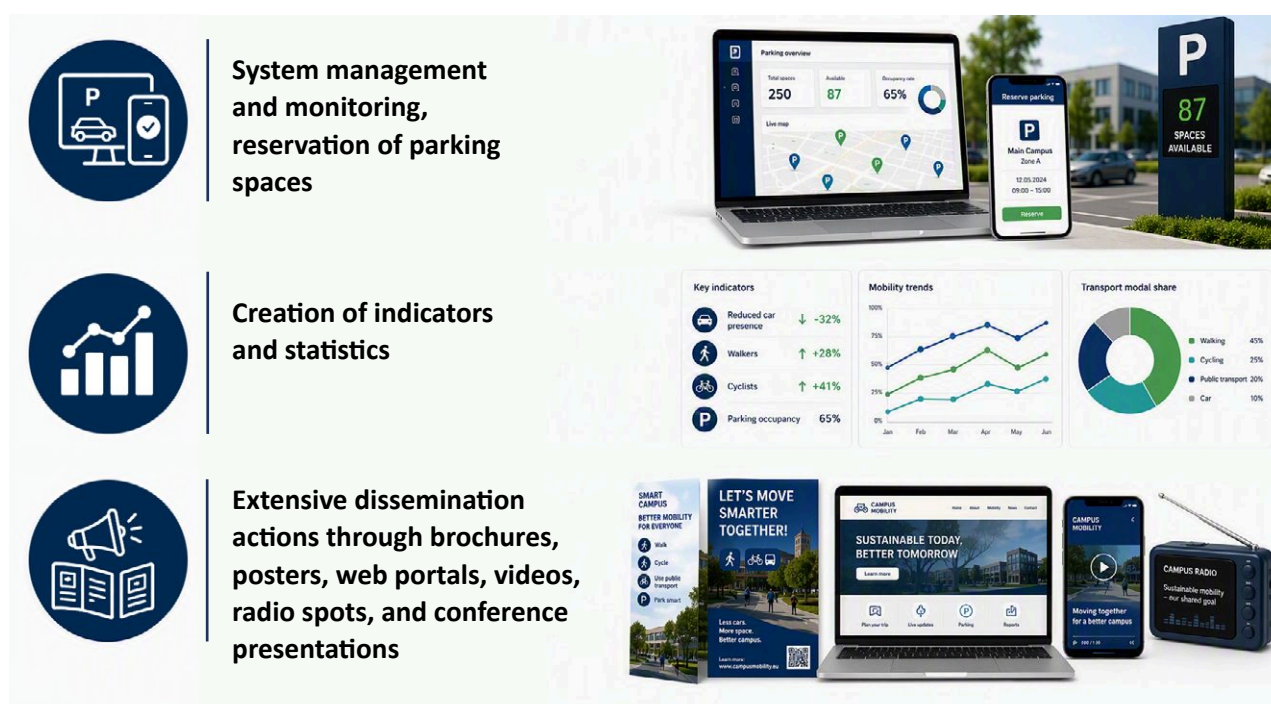
Road with authorised car traffic and designated parking spaces (Source: U-Mob Project, 2018)

FESEDIT Project for Promotion of Car-sharing, University of Girona (UdG), Spain (U-Mob Project., 2018)

The FESEDIT initiative is a technology-based carpooling platform developed by the University of Girona to reduce greenhouse gas emissions and promote more sustainable mobility within the university community.

- Its main goals included decreasing private car use, simplifying daily commuting, and encouraging regular carpooling for short trips, while also ensuring user trust and safety through artificial intelligence-based assessment tools. The initiative aimed to offer flexibility and comfort to users, support local commerce, and create a social mobility network supported by a “social currency” that enabled users to travel free of charge.

The platform connects people from the same community who make similar journeys, allowing them to share their trips via a mobile app or website. It offers real-time updates, last-minute changes, and GPS tracking for both drivers and passengers. To implement the initiative, a range of activities was carried out, including:



The initiative received very positive acceptance among students and good uptake among academic and administrative staff. Its success led to its replication in other communities, including the Catalan Government's Girona office and several universities across Spain. It also gained the support of the Girona City Council, which integrated FESEDIT into its Municipal Urban Mobility Plan and designated special parking spaces for service users. Screenshots of the University of Girona (UdG) car-sharing app are shown below.



Screenshots of the car-sharing app of the University of Girona (UdG), Spain (U-Mob Project, 2018)



Screenshots of the car-sharing app of the University of Girona (UdG), Spain (U-Mob Project, 2018)

4.2.3 New Mobility Policy for Employees, Erasmus University Rotterdam (EUR), the Netherlands (U-Mob Project., 2018)

Erasmus University Rotterdam (EUR) introduced a comprehensive employee mobility policy to reduce staff car dependence and improve the institution's overall CO₂ footprint.

- The policy aimed to shift the modal split away from private car use and toward more sustainable transport options such as public transport, cycling, and electric mobility.

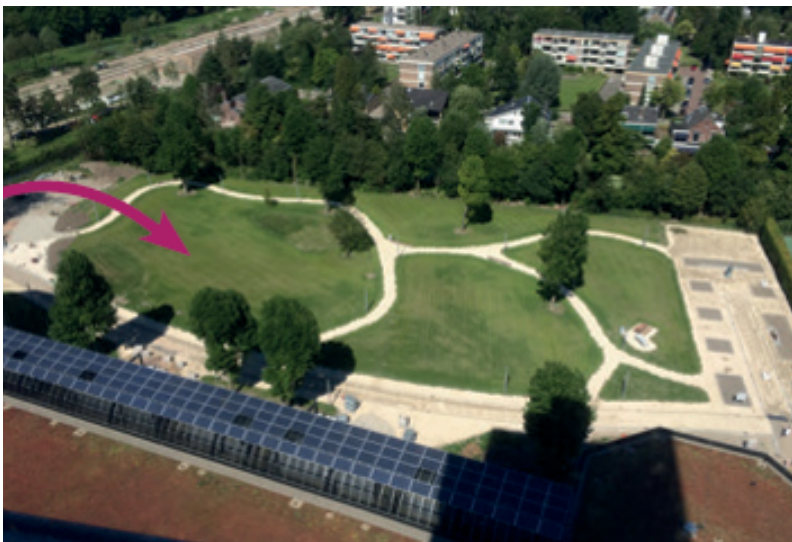
To achieve this, the university implemented several key measures:

- Paid parking was introduced for employees and students, replacing the previously free parking system and making car use a less attractive commuting option
- Strong incentives were offered for sustainable alternatives: employees could receive full reimbursement for public transport passes, and financial support - up to €500 - was made available for the purchase of electric bicycles or scooters.

The effectiveness of the policy was assessed using two main indicators: the modal split among employees and students, and the reduction in CO₂ emissions associated with commuting.



Before the policy (U-Mob Project, 2018)



After the policy (U-Mob Project, 2018)

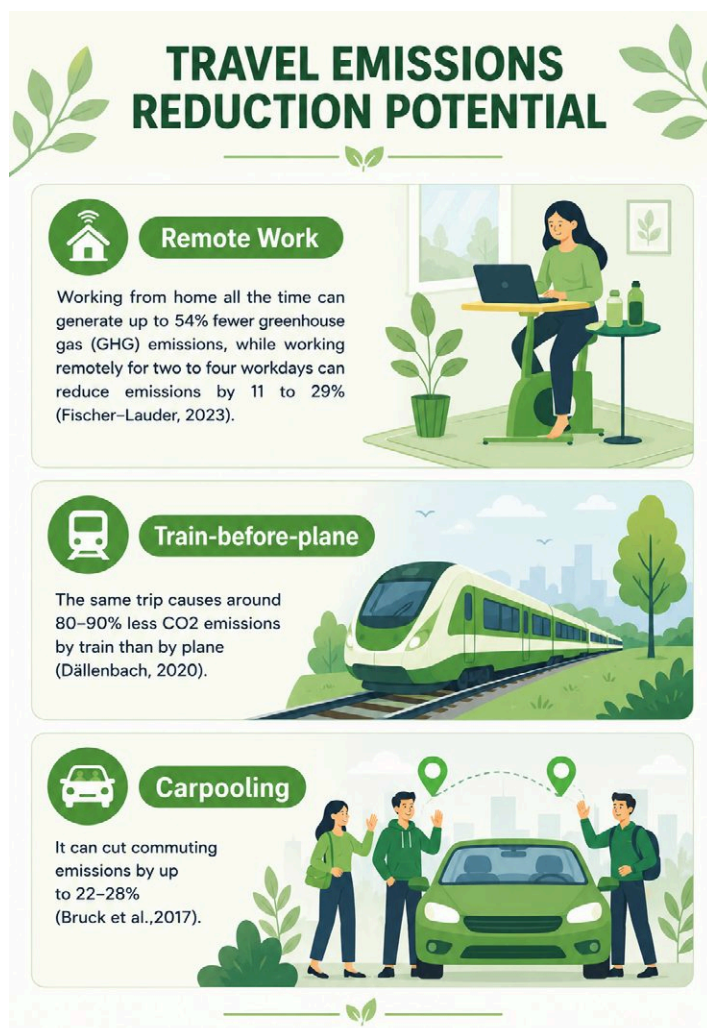
The results demonstrated significant positive change. The share of employees commuting by car fell from more than one-third to just over 30%, and total car-commuting distance decreased by nearly 8%, resulting in an estimated reduction of more than 42 tons of CO₂ (U-Mob Project, 2018). At the same time, the use of public transport and bicycles increased, confirming that the policy successfully encouraged a transition toward more sustainable mobility choices on campus. Images from the Erasmus University Rotterdam (EUR) are shown below.

4.3 A Greener Journey: Emissions Reduction Potential

Remote work can significantly reduce greenhouse gas (GHG) emissions, primarily by eliminating or reducing daily commuting and lowering the energy demand of office buildings. Studies indicate that working from home full-time can result in approximately 54% lower emissions than traditional office-based work. Even partial remote work, such as two to four days per week, can still reduce environmental impact by around 11% to 29%, making it an effective strategy for lowering the environmental impact of work-related activities (Fischer-Lauder, 2023).

Choosing trains over airplanes for travel - often referred to as a “train-before-plane” approach - can also greatly decrease carbon emissions. For the same journey, travelling by train typically produces about 80% to 90% less CO₂ than flying. This is because rail transport is generally more energy-efficient and, in many regions, powered by electricity that can be sourced from renewable energy (Dällenbach, 2020).

Carpooling is another practical way to reduce emissions, especially for daily commuting. By sharing a vehicle with others, the number of cars on the road is reduced, leading to lower fuel consumption and fewer emissions overall. Research suggests that carpooling can cut commuting-related emissions by approximately 22% to 28%, depending on factors such as occupancy rates and travel distance (Bruck et al., 2017).



Travel emission reduction potential

4.4 Learning from Real-World Experience



"Living and working on an island that is largely isolated from green travel options makes it challenging for its citizens-and especially academics-to contribute to the sustainability of our planet. Yet, working from home, sharing cars between campuses, and holding online meetings have allowed us to make small but meaningful contributions toward building a better place to live."



Petroula Mavrikiou

PhD, Associate Professor, Business Administration Department,
Gender Equality & Inclusion Research Unit (RIGE), Frederick University, Cyprus



"By establishing a framework that allows staff to work from home twice a week, we significantly reduced the need for daily commuting. Since our city lacks an efficient public transportation system and most travel is done by car, this shift helped staff use their vehicles far less. As a result, we not only lowered emissions but also improved overall work-life balance."



Antria Karaoli

M.A. Research Associate, Gender Equality & Inclusion Research Unit (RIGE),
Frederick University, Cyprus

4.5 Key Takeaways

- Transport is a major contributor to university carbon footprints, often reaching 30% of total emissions.
- Infrastructure investments - cycling paths, EV charging, shuttle links - create the foundation for sustainable commuting.
- Policies and incentives guide behaviour, making low-carbon choices convenient.
- Digital tools can significantly reduce the need for travel and enhance mobility planning.
- Staff engagement is crucial; sustainability becomes a shared commitment when universities educate, involve, and motivate their community.

Smart mobility is a long-term transformation requiring both physical redesign and cultural change. With the right approach, universities can lead by example, demonstrating how greener travel contributes not only to lower emissions but also to healthier, more connected, and more resilient learning environments.



4.6 Quick wins

- ✓ Review and strengthen travel and commuting policies using a low-carbon travel hierarchy: virtual-first, public transport/train/bus before flight or private car where feasible, and shared travel when travel is necessary.
- ✓ Improve safe and inclusive active-mobility infrastructure, including walking and cycling routes, secure bicycle parking, repair points, lighting, showers/lockers and universal access.
- ✓ Set a sustainable mobility target for the coming year.
- ✓ Pilot practical incentives for greener travel, such as public transport support, cycling incentives, priority parking for car-poolers and Green Commuter recognition.
- ✓ Use digital tools to reduce and optimise travel, including hybrid-meeting equipment, real-time shuttle/public-transport information and digital carpooling platforms.
- ✓ Promote awareness of sustainable travel options.

4.7 Reference List

1. Bruck, B. P., Incerti, V., Iori, M., & Vignoli, M. (2017). Minimizing CO₂ emissions in a practical daily carpooling problem. *Computers & Operations Research*, 81, 40–50. <https://doi.org/10.1016/j.cor.2016.12.003>
2. Dällenbach, N. (2020). Low-carbon travel mode choices: The role of time perceptions and familiarity. *Transportation Research Part D: Transport and Environment*, 86, 102378. <https://doi.org/10.1016/j.trd.2020.102378>
3. Fischer-Lauder, H. (2023). Work from home can cut worker emissions by 54%, study shows. *Impakter*. <https://impakter.com/less-office-fewer-emissions-fully-remote-work-cuts-worker-emissions-by-54/>
4. Helmers, E., Chang, C. C., & Dauwels, J. (2021). Carbon footprinting of universities worldwide: Part I - Objective comparison by standardized metrics. *Environmental Sciences Europe*, 33, 30. <https://doi.org/10.1186/s12302-021-00454-6>
5. Tao, Y., Steckel, D., Klemeš, J. J., & Varbanov, P. S. (2021). Trend towards virtual and hybrid conferences may be an effective climate change mitigation strategy. *Nature Communications*, 12, 7324. <https://doi.org/10.1038/s41467-021-27251-2>
6. U-Mob Project. (2018). *Best practices*. U-Mob: European University Mobility Network for Sustainable Mobility. <https://u-mob.eu/best-practices/>



5 Governance, Engagement, and the Sustainability Roadmap

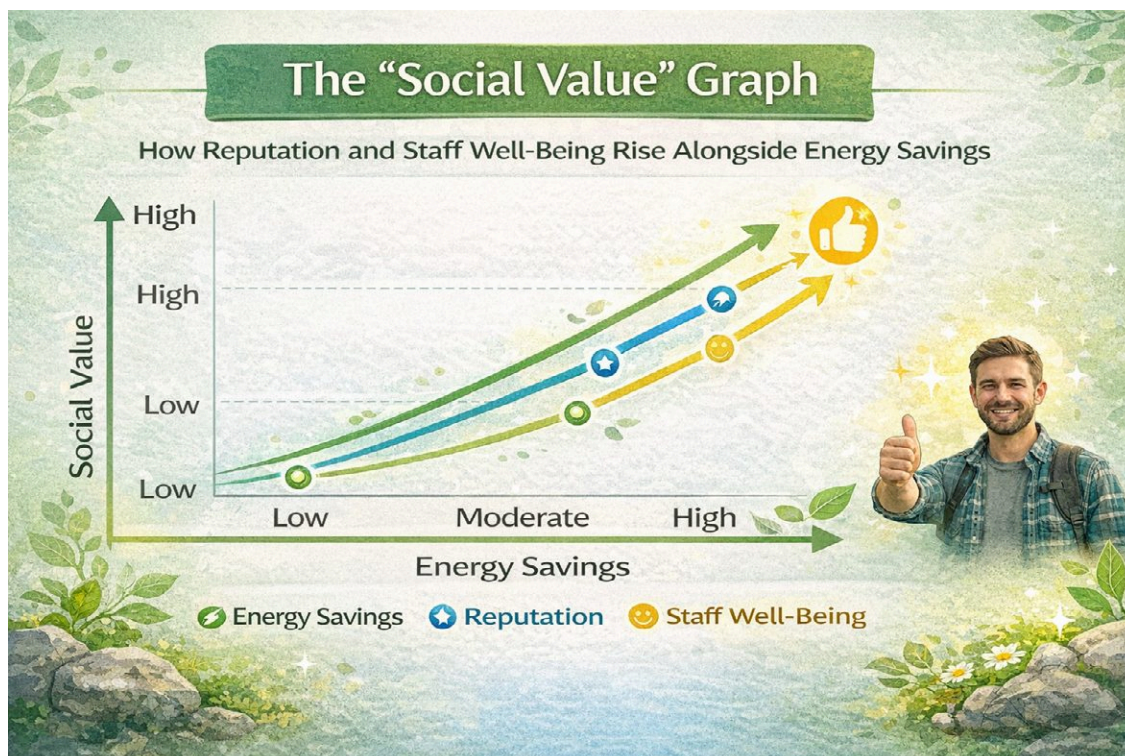
5.1 Introduction: Sustainability as a Shared Ethical Vocation

While the previous chapters on energy, waste, and mobility have provided the “hardware” of a green campus, this chapter focuses on the “operating system”: the people, the governance, and the cultural shifts that make change permanent (Sterling, 2013; Schein, 2010). Creating a green university is far more than a technical challenge or a matter of installing solar panels and sorting waste; it is a foundational philosophy, a strategic investment, and a profound ethical vocation.

This challenge is universal: whether a university operates a physical campus, a blended model, or is entirely online, the imperative to embed sustainability into its strategy, governance, and culture is the same. Green rating systems such as UI GreenMetric, QS Sustainability Rankings, and THE Impact Rankings increasingly reward institutions regardless of their physical footprint; what they measure is institutional commitment, policy coherence, and community engagement. Sustainability is no longer a competitive advantage; it is a baseline expectation.

At the macro level, sustainability in higher education has evolved from an operational concern into a strategic and reputational imperative. International frameworks such as the UN 2030 Agenda and the European Green Deal have repositioned universities as key actors in the societal transition, regardless of their size, mission, or delivery model (European University Association, 2021; UNESCO, 2020).

Academic literature on university sustainability has long focused on physical campus metrics, energy consumption, green spaces, and waste management, as primary indicators of institutional commitment (Leal Filho, 2021; Sugiarto et al., 2022). However, a growing body of research argues that governance structures, cultural change, and stakeholder engagement are the true drivers of long-term sustainability transformation, applicable to any institutional model regardless of its physical configuration (Sterling, 2013; Trencher et al., 2014).



Social value graph

At its core, this is a commitment to Intergenerational Equity, the sacred principle that our current operations must never compromise the ability of future students and staff to thrive (United Nations, 1987), which is the fundamental pillar of Climate Law and of the Green Transition, as well. This strategic approach generates immense Social Value, a non-financial yet economically vital KPI (UNDP, 2022). A sustainable university enjoys a stronger Institutional Reputation, which translates into a higher attraction of international talent, better positioning in global rankings (European University Association, 2021), and an internal sense of pride that significantly reduces staff turnover.

By shifting from “top-down” mandates to a shared organisational culture, sustainability ceases to be a bureaucratic duty and becomes a way of life in the office, the lab, and the classroom. We move away from the “dry” technicality of infrastructure to embrace a vibrant Green Culture. In the following pages, we explore how to build the “brain” and the “heart” necessary to coordinate the “muscles” described in the previous chapters.

5.2 Strategic Infrastructure: The Distributed Leadership of The Three-Tier Governance Model

Effective governance doesn’t control; it **empowers**. To transition from a traditional institution to a green leader, the infrastructure of power must become transparent and collaborative, because effective sustainability is not a top-down mandate; it is a **Regia** (an orchestration) of different levels of energy (Leal Filho, 2021).

We propose a structured yet flexible governance model to move from vision to daily habit, based on an ideal Green pyramidal hierarchy.

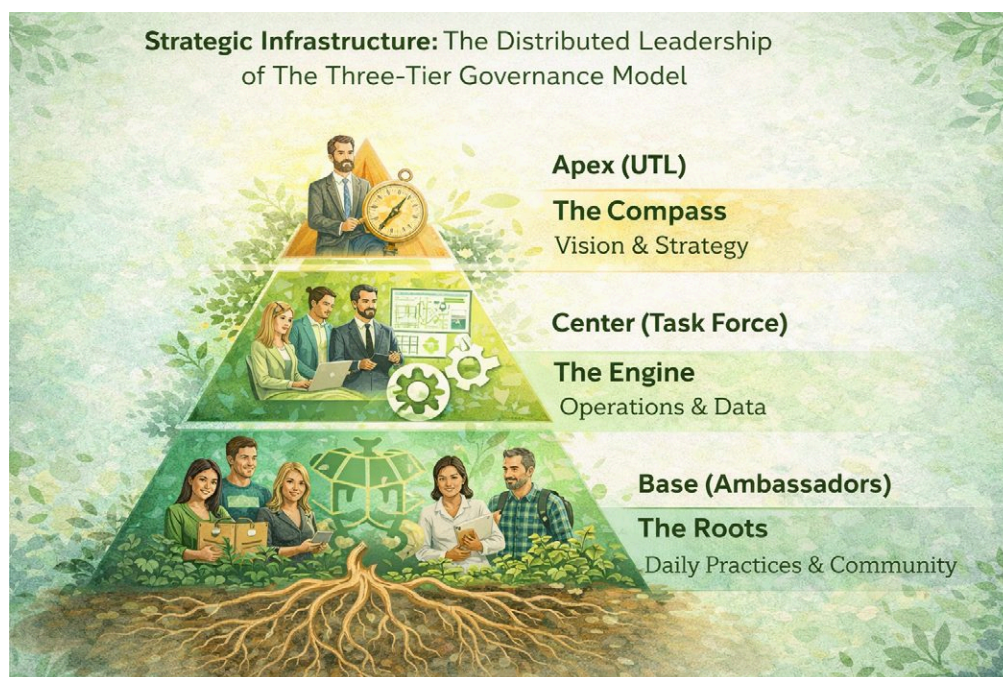


Fig 2: Three -Tier Governance Model

Tier 1: The University Transition Leader (UTL) – The Visionary

At the apex is a high-level strategic coordinator (e.g., a Vice-Rector, or another Rector’s Delegate or a Chief Sustainability Officer). The UTL ensures that the “green thread” is woven into the university’s mission sustainability, and it is not just a “side project” or facade operation, but is embedded in the **University Strategic Plan**. Their role is to align sustainability with the budget, the institutional strategy, and external partnerships. They provide the **vision**.

Tier 2: The Sustainability Task Force – The Engine

This is the cross-functional operational heart of the campus. A multidisciplinary team of experts and managers from Facilities, IT, Finance, and HR to translate the vision into action. Their job is to bridge the gap between policy and practice.

- They manage the **Green Dashboard**.
- They design the **Green Procurement** guidelines.
- They coordinate the **Sustainability Jam** sessions to solve operational bottlenecks.
- They are in charge of **Annual KPI tracking; Baseline Audit Template; Green Dashboard maintenance; Self-Assessment Survey coordination**.

Tier 3: Unit Ambassadors – The Pulse

The most critical level. Every department or administrative unit appoints a **Sustainability Ambassador** to share progress and ideas, serving on an advisory board that supports the UTL in communicating with the Institution's strategic Top Management.

Their role is based on a triple helix model (Lozano, 2006):

- **The Bridge:** They bring “bottom-up” ideas from their colleagues to the Task Force.
- **The Problem-Solvers:** They resolve minor daily questions (e.g., “Where do I dispose of this specific lab waste?”) and encourage “Energy Mindfulness” within their team.
- **The Influencers:** They act as a peer-to-peer support network, making the transition feel like a shared journey rather than a top-down mandate.

This way they ensure:

- **Bottom-up Innovation:** They bring ideas directly from the offices to the Task Force.
- **Daily Support:** They act as the “go-to” person for colleagues' green-related questions.
- **Culture Carriers:** They ensure that the specific needs of an “Engineering lab” vs. a “History library” are respected in the general transition.



“Sustainability is above all an organisational challenge. Green competence only takes root when every member of an institution, from leadership to administrative staff, is genuinely involved in the change. Inclusion is not an option; it is the engine of any lasting green transition.”



Green competence is not a checkbox on a training plan. It is the collective capacity of an institution to think sustainably, act responsibly, and inspire others to do the same. That capacity must be cultivated at every level, through inclusion, recognition, and shared purpose.

Invite every higher education leader reading this guide to see sustainability not as a burden, but as the most powerful engine of institutional renewal available to us today.”

Dr. David Vannozzi

General Manager, MED.E.A. - Pegaso International | Vice President, Multiversity Group

5.2.1 Adapting the Governance Model to Your Institution

The Three-Tier Governance Model is intentionally flexible. Institutions differ significantly in size, mission, and delivery mode. Also Online universities can score highly in green rankings by focusing on digital efficiency, virtual mobility, and engagement platforms, proving that a physical campus is not a prerequisite for sustainability leadership.

The table below offers practical guidance on how to adapt the model to three common HEI contexts.

Context	Key Adaptations
Large campus universities	UTL: Appoint a full-time Chief Sustainability Officer. Task Force: Formal cross-departmental committee. Ambassadors: One per faculty/building. Use digital dashboards for real-time monitoring across multiple sites.
Small HEIs	UTL + Task Force: A single coordinator can fulfil both roles. Focus on 2–3 high-impact priority areas. Ambassadors may serve across multiple departments. Leverage inter-institutional partnerships to share resources and expertise.
Online / blended universities	Digital-first governance: Operate primarily through digital channels. Sustainability focus shifts toward digital efficiency (server energy use, paperless operations, virtual mobility). Engage staff and students via online platforms, webinars, and digital campaigns. Ambassadors coordinate remotely through dedicated sustainability channels.

Role Matrix

To convert strategic ideas into tools, we provide a clear breakdown of responsibilities:

Governance Tier	Strategic Level	Core Responsibilities	Key Tools & Actions	Reporting & Interaction
Tier 1: University Transition Leader (UTL)	Strategic (The Visionary)	Strategic alignment; Budgeting; External and institutional partnerships.	University Strategic Plan; Green Roadmap oversight.	Direct reporting to the Rector; High-level networking with local/global stakeholders.
Tier 2: Sustainability Task Force	Operational (The Engine)	Cross-functional coordination; Translating policy into daily procedures.	Green Dashboard; Green Procurement guidelines; Sustainability Jams; Annual KPI tracking; Baseline Audit Template; Self-Assessment Survey.	Monthly audits; Coordinating technical interventions (IT, Facilities, HR).
Tier 3: Unit Ambassadors	Local (The Pulse)	Departmental engagement; Peer-to-peer influence; Bottom-up innovation.	Survival Kit for Staff; Quick Win Checklists; Daily troubleshooting.	Weekly feedback loop; Bringing office-level ideas to the Task Force.



Operational Responsibility Matrix

The Sustainability Office as a “Value Hub”

Based on this collaborative leadership model, the Sustainability Office, transversal to all the units, whether administrative or didactic, should not act as a “green police” but as a facilitator (Kotter, 2012). Its role is to help departments navigate regulations, secure funding for green initiatives, and streamline the transition.

Therefore, they can create a concrete tool to streamline the process, such as **The Survival Kit for Department Heads**. Providing leaders with a “Change Management Kit” consisting in practical templates, talking points for staff meetings, and “Quick Win” checklists can drastically reduce the friction of change and the resistance to it, easing the process (Hiatt, 2006).

The Green Dashboard - Data Transparency & Real-Time Awareness

To bridge the gap between abstract climate goals and daily campus life, institutions must make their environmental performance visible, tangible, and undeniable.

- **Live Data Dashboards:** Results from the smart sensors and monitoring systems (mentioned in Chapter 2) should be transformed into intuitive Green Dashboards. By displaying real-time energy savings and resource consumption on corridor monitors and the university’s homepage, we turn “invisible” data into a powerful tool for shared awareness. This constant feedback loop empowers the community to see the immediate impact of their collective efforts.



Green Campus Dashboard

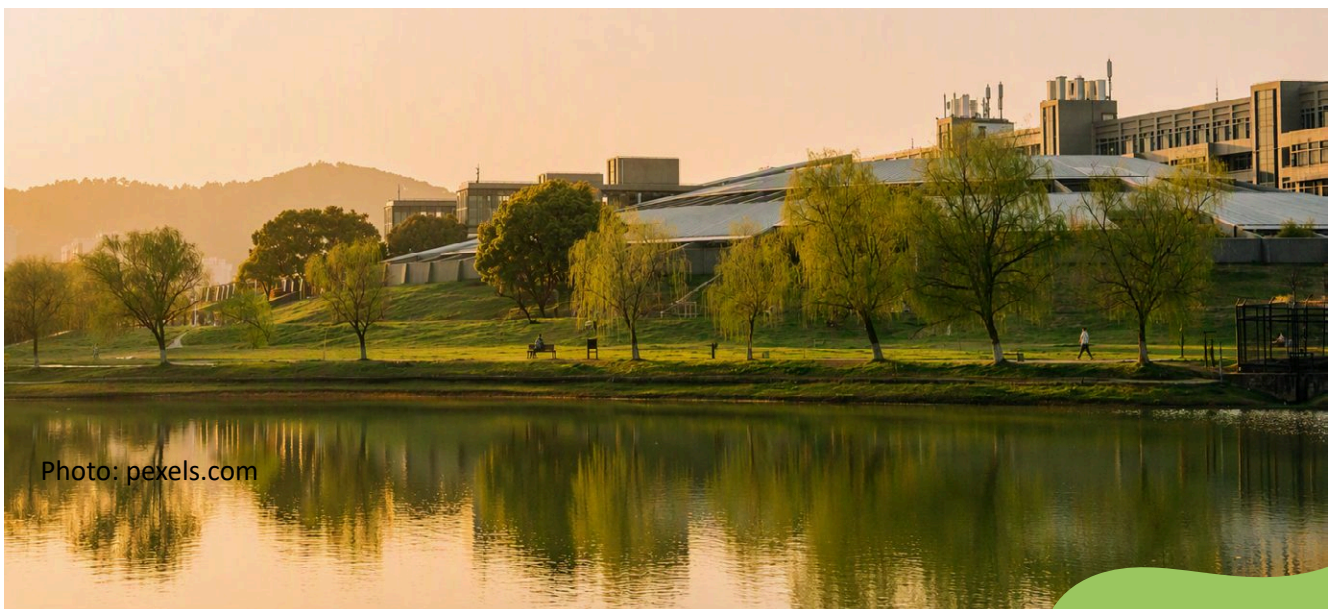


Photo: pexels.com

The Human Narrative & Institutional Belonging

While numbers tell us what is happening, stories tell us who is making it happen, fostering a deep sense of shared identity and emotional connection to the university's mission.

- The Annual Green Yearbook: Beyond cold statistics and official reports, we encourage the publication of an annual "Contributor Yearbook." This initiative features the photos, faces, and success stories of the staff, students, and technicians who implemented green projects during the year. By celebrating individual contributions, we humanise the transition and empower every member of the community to see themselves as a true Agent of Green Change, boosting long-term motivation and institutional pride.



"Information is the power of change; recognition in social contexts is the fuel of engagement."

Rector Prof. Luigia Melillo

MED.E.A. University
– Former Full Professor of Intercultural Bioethics



Yearbook Previews

Since transparency and a shared narrative are the greatest driver of belonging, together with official reports, we encourage innovative initiatives like:

- **The Annual Green Yearbook:** Beyond cold numbers, publishing an annual report that functions like a "Contributor Yearbook," featuring photos and stories of the staff, students, and technicians who implemented a green project can really boost people's motivation and empower

The Annual Green Yearbook

Meet the Change-Makers of Our Campus



Professor Davis

"Every small change we make ripples through the entire campus."



Cindy
Campus Facilities



Samantha

"The rooftop garden we've built together is a breath of fresh air!"



Mike
Technician



Dr. Chen
Researcher

"My research focuses on sustainable solutions for our campus."



Anna
Admin



Mark
IT

"Creating the sustainability dashboard was a great team effort!"

5.3 People & Engagement: From Participation to Co-creation

Sustainability is a “Living Lab” where the administrative staff are not just users, but co-designers of their own work environment (Trencher et al., 2014).



Sustainability tree

Thinking out of the box can really make a difference. The following proposals can be a brilliant and pleasant way to introduce green topics and behaviours in universities.

Gamification: The “Green Department” Contest

To make the transition “smart” and fun, we introduce a gamified reward system:

- **Monthly Milestone** - Recognition for the “Greenest Department of the Month” based on data (energy saved, waste reduced) and ideas proposed.
-
- **Annual Winner**: The top-performing department of the previous academic year is officially rewarded during the **Opening Ceremony of the next Academic Year**, highlighting their contribution to the university’s mission in front of the entire community.

Annual Green Idea Contest

- **The “Sustainability Jam”:** Quarterly brainstorming sessions where staff from different departments (e.g., HR and Maintenance) meet to “jam” on a specific problem.
- **Crowdsourcing:** A digital platform where any staff member can submit a project (e.g., “Replacing plastic binders with a digital archive system”).
- **The Award:** The winning project receives seed funding and is implemented. The winning team is officially honoured at the **Opening of the Academic Year** and receives a prestigious award from the Rector.

Well-being: Green Governance = Less Stress

A sustainable office is a healthier office. By dematerialising processes (digital workflows), improving natural lighting, and introducing indoor greenery, we reduce cognitive load and stress. **Sustainability is the ultimate well-being strategy** (Foellmer et al., 2021).



- **Less Stress, More Flow:** Digitalisation isn’t just eco-friendly; it removes the physical stress of paper bureaucracy.
- **Biophilic Offices:** Integrating plants and natural light (Biophilia) improves air quality and mental focus.
- **Sense of Purpose:** Employees who feel their work contributes to a “higher cause” (the planet) report 30% higher job satisfaction (Nidumolu et al., 2009).



“Educational Institutions cannot be effective in reaching their goals, whether in initial training or continuing professional development, without taking care of the physical teaching and learning environment. Therefore, Green governance can be considered a true health intervention.”



Rector Prof. Luigia Melillo

MED.E.A. University – Former Full Professor of Intercultural Bioethics

Living Labs: Bridging Research, Staff, and Students

The administrative office should not be a “passive user” of green tech; it is a **Testing Ground**. In our **Living Labs**, researchers, administrative staff, and students collaborate on real operational challenges (Evans et al., 2015).

- **Example:** A group of Engineering students works with the Facilities staff to optimize the cooling system of the server room.
- **The Result:** The staff gains technical expertise, the students gain “real-world” credits, and the university saves money. **The campus is the classroom.**

But introducing new procedures and habits can also be very stressful and result in a burden for job related burnout.

Survival kit for staff.

We recognise that University and Department heads are often overloaded. To avoid “sustainability fatigue,” we provide, as a counterpart to the **Survival Kit for Department Heads** a **Survival Kit for staff**, including instructions for students to facilitate the interaction with the staff and support the realisation of the expected activities by adopting the proper measures with all the actors involved. This is not another manual, but a **facilitator’s toolbox**:

- **The “Quick Win” Checklist:** Low-effort, high-impact actions to start a green month and help people meet leaders’ expectations.
- **Meeting Templates:** Pre-written slides and talking points to report about green initiatives to leaders without adding prep time.
- **The “Incentive Map”:** A guide on how to recognise and reward staff excellence, helping **motivating people do drive and be the change they want to see in the world.**

5.4 The Sustainability path: A story of continuous improvement

5.4.1. PDCA (Plan-Do-Check-Act) cycle

A path of growth is not a static list of deadlines or a rigid calendar of events; it is a **living trajectory**.

To navigate this journey, we propose adopting the **PDCA (Plan-Do-Check-Act)** cycle, a world-class management methodology used by the most innovative organisations globally (Deming, 1986; ISO 14001:2015). By applying this “Deming Cycle” to our campus, we ensure that every green initiative is grounded in data, tested in reality, and celebrated upon success.

This process transforms the university into a perpetual motion machine of improvement, where every staff member becomes a manager of change through four clear stages:

- **PLAN (Audit & Strategy):** We begin by looking in the mirror. We collect precise data, from energy consumption to overall resource dematerialisation metrics, to establish our baseline. In this phase, we set ambitious but realistic targets and identify the stakeholders necessary to achieve them. Planning is about turning a “green dream” into a structured project.
- **DO (Pilot Implementation):** Here, theory meets the reality of daily campus life. We launch targeted interventions within our “**Living Labs**”. Starting with small-scale pilots allows us to test innovative ideas in a controlled environment, reducing risks and gathering immediate feedback from those who actually use the spaces.
- **CHECK (Monitoring & Transparency):** We don’t just “hope” for results; we measure them. Using the **Green Dashboards**, we compare actual performance against our initial KPIs. This stage is about total transparency: we analyse what worked and, more importantly, we learn from what didn’t, ensuring that our next steps are even smarter.
- **ACT (Standardisation & Celebration):** When a pilot succeeds, we move to make it the “new normal.” We scale the solution to the entire campus and integrate it into official university procedures. Crucially, this is the moment for **Celebration**: we reward the contributors and showcase their success, fueling the motivation for the next cycle.

1. The "PDCA Circle": A sleek, colorful circular arrow showing "Audit → Pilot → Monitor → Scale & Celebrate."



PDCA scheme

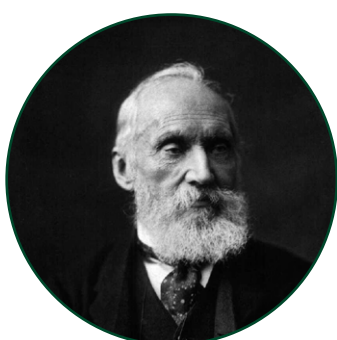
5.4.2 Beyond the Environment: Developing a Culture of Process

Embracing the PDCA cycle does more than save energy; it fosters a **Culture of Process** that enriches the university's human capital. Mastering this methodology provides staff with invaluable **transversal management skills**, such as data-driven decision-making, agile problem-solving, and cross-functional collaboration.

By participating in the sustainability roadmap, employees evolve into Change Managers. These "soft skills" are highly transferable and represent a significant professional value-add, transforming the green transition into a high-level training ground for future leadership. Sustainability, therefore, is not just a benefit for the planet but a powerful engine for professional empowerment and institutional excellence.

This journey is deeply rooted in a robust **Data Culture**. Precise measurement and clear indicators are not just technical requirements; they are the bedrock of a modern institution. A well-defined baseline allows us to replace opinions with facts, turning subjective effort into objective achievement. By quantifying our progress, we create a transparent language of improvement that empowers every department to reach its full potential.

Ultimately, we believe that transparency is the first step toward transformation. For this reason, every action within our roadmap is tied to measurable results, following the timeless principle expressed by **Lord Kelvin**:



"If you cannot measure it, you cannot improve it."

Lord William Thomson Kelvin

Photo: Wikipedia



5.4.3 Measuring What Matters: KPIs and Monitoring Tools

A governance framework is only as strong as its ability to track progress. The following indicators and tools are designed to help institutions move from intention to evidence, and from reporting to learning. They complement the PDCA cycle and provide the measurable foundation needed to demonstrate real impact.

Suggested Sustainability KPIs by Governance Area

Governance Area	Indicator	Measurement Unit
Leadership & Strategy	Sustainability strategy formally adopted	Yes / No
	Sustainability integrated into University Strategic Plan	Yes / No
	Annual sustainability report published	Yes / No
Governance Structure	Sustainability Office or equivalent established	Yes / No
	Number of active Unit Ambassadors	Count
	Staff trained on sustainability practices	% of total staff
Engagement & Culture	Staff/student participation in sustainability initiatives	% or count/year
	Number of Green Ideas submitted and implemented	Count/year
	Departments participating in Green Department Contest	Count
Procurement	% of purchases meeting green criteria	%
	Green procurement policy formally adopted	Yes / No
Digital Transition	% of administrative processes fully digitized	%
	Paper consumption per staff member	Reams/year
Monitoring & Transparency	Green Dashboard operational and publicly accessible	Yes / No
	Frequency of sustainability reporting to leadership	Monthly / Quarterly / Annual
	PDCA cycles completed per year	Count

Practical Monitoring Tools

Institutions do not need sophisticated systems to begin monitoring. The following low-barrier tools are sufficient for most HEIs at early stages:

- **Green Dashboard:** A simple shared spreadsheet or basic web interface displaying key metrics updated monthly by the Task Force. Free tools such as Google Data Studio or Power BI (free tier) can visualise data without a dedicated IT infrastructure.
- **Annual Self-Assessment Survey:** A short online questionnaire (10–15 items) sent to all Ambassadors at the end of each academic year to assess progress, barriers, and emerging priorities.
- **Baseline Audit Template:** A structured spreadsheet covering energy, waste, water, paper, procurement, and mobility, completed once per year at the department level and consolidated centrally by the Task Force.
- **UI GreenMetric Submission:** For institutions ready for external benchmarking, participation in the annual UI GreenMetric ranking provides a standardised, internationally recognised framework covering seven categories and 60 indicators. It also serves as an external accountability mechanism.

Reporting Cadence

Level	Frequency	Format
Unit Ambassadors → Task Force	Monthly	Short update (email or form)
Task Force → UTL	Quarterly	Dashboard review meeting
UTL → Rector / Governing Body	Annual	Sustainability Report
Institution → External Stakeholders	Annual	Public report / website

5.4.4 The Sustainability Roadmap: A Journey to 2030

If the PDCA cycle is the engine of our transition, the **Sustainability Roadmap** represents our compass. It defines the strategic milestones that will transform our institution from a traditional campus into a global leader in sustainability by the end of this decade.

This journey is structured into three progressive phases, each designed to build upon the successes of the previous one, ensuring that our growth is both systemic and culturally rooted:

- PHASE 1: Awareness & Baseline Audit (The Foundation):** We cannot manage what we do not understand. The first phase is dedicated to a rigorous “reality check”: auditing our systemic resource consumption footprint to create a factual baseline. Simultaneously, we focus on the human element: **Awareness**. This is the time for cultural mobilisation, where we challenge individual habits and ignite the first sparks of a green mindset across all departments. The goal is to move from “passive users” to “conscious actors” of the campus.
- PHASE 2: Integration & Green Procurement (The Back-end Revolution):** In the second phase, sustainability becomes “business as usual.” We shift our focus to the institutional **back-end**: the systems and policies that govern our daily operations. Sustainability is no longer an option but a mandatory requirement in our **Green Procurement** policies. From laboratory equipment to office supplies, every purchase is filtered through environmental criteria. By integrating sustainability into our official regulations, we ensure that the transition is hard-coded into the university’s DNA.
- PHASE 3: Leadership & Collective Impact (The Climate Anchor):** By 2030, our university aims to transcend its own boundaries. Having optimised our internal ecosystem, we emerge as a “**Climate Anchor**” for the city and the region. In this phase, we lead by example by influencing local policies, sharing best practices with industry partners, and serving as a hub for social innovation. Our campus becomes a lighthouse, demonstrating to the world that a large-scale institution can achieve total sustainability while enhancing its core mission of research and education.





The 2030 Development Pathway

Achieving the 2030 Vision

This roadmap is not just a timeline; it is our contribution to the **UN 2030 Agenda**. By following these phases, we ensure that our results are not isolated “green islands” but part of a coherent, long-term strategy.

Just as in the PDCA cycle, the success of this roadmap depends on the quality of our measurement and the persistence of our efforts. This structured approach allows us to monitor our progress in real time and adjust our trajectory through the feedback loops of our **Living Labs**. Ultimately, we are not just reaching a destination; we are building a permanent institutional capability—a legacy of excellence and responsibility that will define our university for generations to come.

Key Milestones to 2030: From Targets to Impact

To measure our progress along the roadmap, we have identified three critical “checkpoints.” These milestones represent the concrete transformation of our university’s operational reality:

- **2025–2026: The Digital Leap (Awareness & Digitalisation).** Our immediate priority is the drastic reduction of our physical footprint. We aim to reach **90% paperless administration** by transitioning all document workflows, archives, and signatures to digital-first formats. This is not just a technological shift but a cultural one: it saves trees, reduces waste management costs, and significantly increases the speed and efficiency of our daily work.

- **2027–2028: Systemic Integration (Green Procurement).** This milestone marks the point where sustainability becomes the “default setting” for our institution. We will implement a policy where **100% of all procurement**—from heavy machinery to catering services—must meet mandatory green criteria. By aligning our purchasing power with our values, we incentivise the market and ensure that every euro the university spends contributes to a healthier planet.
- **2030: The Institutional Legacy (Regional Leadership).** By the end of the decade, the university will fully realise its role as a **carbon-neutral anchor for the city**. Our campus will no longer be just a consumer of energy but a model of resilience and responsibility. We will serve as a lighthouse for the region, demonstrating that achieving net-zero impact is possible for large-scale public institutions through planning, innovation, and community engagement.



5.5 Education & external Partnerships: The Open Campus

The university’s green mission extends beyond its gates. We act as a Social Innovation Hub (UNESCO, 2020) for our city and our partners.

- **Green Weeks & Green Days:** We propose one “Green Day” per month to celebrate milestones and engage in improving processes, showcasing initiatives, delivering training, giving lectures and discussing; to host an annual Green Week to showcase our Living Lab results to local businesses and the municipality and also celebrate Green Special Days linked to global milestones (e.g., the anniversary of the Paris Agreement).
- **Strategic Stakeholder Partnerships:** We collaborate with local industries to test their environmental technologies on our campus. This creates a bridge between the Academy and Industry, fostering local economic growth.



No governance framework succeeds without informed citizens. From broad initiatives like the Horizon 2020 SILVANUS Project, we learned that education, from advanced training from professionals to citizen courses and an interactive app for school students, can play a key role in promoting awareness in Green Transition, developing Green competencies and mitigating the impact of climate change. Equally, applied research and multistakeholder networks are the missing link between environmental policy and real behavioural change. Concrete collaboration between academia, institutions, and communities translates scientific knowledge into measurable impact in the fight against climate change.



Prof. Michele Corleto

Pegaso University – MED.E.A. University P.I. Horizon 2020 SILVANUS Green Deal Project

5.6 Conclusion: Leading by Example

Governance is about **Responsibility**. By adopting this roadmap, our university doesn't just "talk" about the future; we build it. Every digital signature, every shared idea, and every kilowatt saved is a brick in the foundation of a **Sustainable Living Culture**.

As a leader in education, our most powerful lesson is the **example we set** in our daily operations.



Sustainability begins with data, but it survives through people effort and engagement. Based on the lesson of Lord Kelvin, we could say that, for sure, what we do not measure we cannot improve, but we can also say, on the contrary, that the achievements we celebrate become the milestones we commit to empowering and sustaining.

Engagement of all the actors in the system is the key factor for sharing narratives, objectives, metrics, and protocols, and for creating a culture of continuous improvement.

Data and knowledge sharing are the only proper ways to drive the change we want to see in the world, starting with data-driven, evidence-based policies.

Alessia Sciamanna

Doctoral Researcher Pegaso University – MED.E.A. University



5.7 Selected Good Practices

PRACTICE 1: The "Living Lab" Office (Co-design)

Description: Instead of imposing a new waste system, a department uses a "Living Lab" approach where administrative staff and students co-design the layout of their office.

Value: Co-designed interventions have a 40% higher compliance rate. It bridges the gap between those who study sustainability and those who manage the campus.

PRACTICE 2: Simplified Green Procurement

Description: A "Fast-Track" digital catalogue for office supplies where eco-certified products are pre-approved and highlighted.

Impact: Reduces bureaucracy for staff while ensuring 100% of new purchases align with the 2030 Roadmap.

Selected existing best practices implemented in Universities worldwide

PRACTICE 1: The “Green Office” Peer-to-Peer Program – Harvard University (USA)

Description: Harvard implemented a distributed leadership model where individual departments appoint “Green Office Leads.” These are staff members who receive specialised training to act as Sustainability Ambassadors within their specific administrative units.

The Innovation: Instead of a top-down mandate, it relies on peer-to-peer influence. Ambassadors use a structured checklist to audit their own offices and implement “Quick Wins.”

Impact: Over 200 offices certified. It successfully turned sustainability into a local, daily habit rather than a distant central policy.

<https://hls.harvard.edu/facilities/sustainability/green-team-green-office/>



<https://news.harvard.edu/gazette/story/2015/10/environmental-awareness-grows-from-peer-to-peer/>

PRACTICE 2: “Green Rewards” Gamification – Nottingham Trent University (UK)

Description: NTU launched a digital platform and app called “Green Rewards” designed specifically for staff and students. It uses gamification to reward sustainable behaviours (such as using stairs, reducing printing, and attending webinars).

The Innovation: Departments compete in a League Table. The winning teams each month earn vouchers or “charity points” that they can donate to local green projects.

Impact: Significant reduction in energy use and a massive boost in staff engagement. It transformed the “dry” data of carbon saving into a fun, social competition.



<https://www.ntu.ac.uk/about-us/strategy/sustainability/green-rewards>

PRACTICE 3: The Sustainable Projects Fund – University of Edinburgh (UK)

Description: To foster Crowdsourcing of Ideas, the university created a dedicated “Small Projects Fund” accessible to all technical and administrative staff.

The Innovation: Any staff member can submit an idea to improve their department’s efficiency (e.g., a new system for chemical recycling in labs). If the idea is viable, the university provides the seed funding and technical support to implement it.

Impact: It has empowered “hidden innovators” among the staff, leading to high-impact operational changes that researchers alone would never have identified.



RECENT EXAMPLE

Chemical Recycling System for Teaching Labs

Funded through the Sustainable Projects Fund, this system reduces chemical waste and costs while improving safety in our labs.



Less waste.
Lower impact.
Smarter labs.

<https://sustainability.ed.ac.uk/news/2017/scf-update-april2017>

PRACTICE 4: The “Living Lab” for Operations – University of British Columbia (Canada)

Description: UBC pioneered the “Campus as a Living Lab” framework, where the university’s physical infrastructure and administrative processes are used as a testing ground for research.

The Innovation: It creates formal Cross-Functional Teams where Facilities managers, Administrative staff, and PhD students collaborate on real-world problems (e.g., testing new bio-energy systems for campus heating).

Impact: It bridged the gap between academia and operations, creating a “Sense of Purpose” for the staff, who now see themselves as essential partners in the university’s research mission.

<https://sustain.ubc.ca/research/campus-living-lab>

EXAMPLE PROJECT



Testing Bio-Energy Systems for Campus Heating

A living lab project to evaluate and optimize low-carbon energy solutions for UBC.



5.8 Quick wins



Appoint a Sustainability Ambassador in at least one department or administrative unit.



Run one “Sustainability Jam” session, bringing together staff from two different departments to identify a shared operational bottleneck



Launch a “Quick Win” checklist for your office



Set up a simple shared spreadsheet to track sustainability KPIs



Schedule a first PDCA review: pick one existing green initiative, measure its current baseline, and set a target for next semester



Work on a Comprehensive Action Plan on the Green Transition



5.9 Reference list

1. Deming, W. E. (1986). Out of the Crisis. MIT Press. (Original source for the PDCA/Deming Cycle).
2. European University Association (EUA). (2021). Greening in European higher education institutions: A governance, funding and efficiency perspective. EUA Publications.
3. Evans, J., Jones, R., Karvonen, A., Millard, L., & Wendler, J. (2015). Living labs and co-production: University campuses as platforms for sustainability science. *Current Opinion in Environmental Sustainability*, 16, 1–6. <https://doi.org/10.1016/j.cosust.2015.06.005>
4. Hiatt, J. (2006). ADKAR: A Model for Change in Business, Government and our Community. Prosci Learning Center Publications.
5. International Organization for Standardization. (2015). ISO 14001:2015 Environmental management systems — Requirements. Guidance Document.
6. Kotter, J. P. (2012). Leading Change. Harvard Business Press.
7. Leal Filho, W., Brandli, L., Castro, P., & Newman, J. (Eds.). (2017). Handbook of Theory and Practice of Sustainable Development in Higher Education (Vol. 1). Springer Nature. <https://doi.org/10.1007/978-3-319-47868-5>
8. Lozano, R. (2006). Incorporation and institutionalization of SD into universities: Breaking through barriers to change. *Journal of Cleaner Production*, 14(9-11), 787–796. <https://doi.org/10.1016/j.jclepro.2005.11.010>
9. Nidumolu, R., Prahalad, C. K., & Rangaswami, M. (2009). Why Sustainability Is Now the Key Driver of Innovation. *Harvard Business Review*, pp 57-64.
10. Schein, E. H. (2010). Organizational Culture and Leadership (4th ed.). Jossey-Bass.
11. Sterling, S., Maxey, L., & Luna, H. (Eds.). (2013). The Sustainable University: Progress and Prospects. Routledge. <https://doi.org/10.4324/9780203101780>
12. Trencher, G., Bai X., Evans J., McCormick K, and Yarime M. (2014). University partnerships for co-creating sustainability: Experiences and insights from across the globe. *Global Environmental Change*, 28, 153-165.
13. UNESCO. (2020). Education for Sustainable Development: A Roadmap. UNESCO Digital Library.
14. United Nations Development Programme (UNDP). (2021). Social and Environmental Standards. UNDP. <https://www.undp.org/publications/undp-social-and-environmental-standards>
15. United Nations. (1987). Our Common Future (The Brundtland Report). Oxford University Press. (The origin of the “Intergenerational Equity” concept).
16. United Nations. (2015). Transforming our world: the 2030 Agenda for Sustainable Development. UN Publishing.



6 Green Campus checklist

A Green Campus Checklist is a practical tool that helps higher education institutions integrate green approaches & sustainability into everyday campus operations, teaching, research, and community life. It provides universities, faculties, and administrative units with a structured framework for assessing current practices and identifying opportunities for improvement across biodiversity conservation, energy efficiency, waste reduction, digital sustainability, sustainable mobility, water management, responsible procurement, food systems, and environmental awareness. By implementing the actions outlined in this checklist, institutions can reduce their environmental footprint, enhance campus well-being, create healthier and more attractive learning environments, engage students and staff in sustainability initiatives, and contribute to achieving the Sustainable Development Goals (SDGs). The checklist is intended as a practical resource to support continuous improvement and foster a culture of sustainability across the entire university community.

This checklist is intended as a self-reflection and planning tool rather than a formal assessment instrument. Universities differ significantly in size, infrastructure, governance models, geographical conditions, and institutional missions. Therefore, some items may not be applicable in all contexts. Institutions are encouraged to use the checklist flexibly, identify areas for improvement, and prioritise actions that best match their local circumstances and sustainability goals.

Biodiversity & Nature

- ☐ Plant native and climate-adapted species
- ☐ Create pollinator-friendly gardens
- ☐ Establish “No-Mow Zones” on campus
- ☐ Reduce lawn mowing frequency
- ☐ Replace lawns with wildflower meadows
- ☐ Install birdhouses and insect hotels
- ☐ Create microhabitats for wildlife
- ☐ Ban or reduce pesticide use
- ☐ Use biological pest control methods
- ☐ Develop green roofs and green walls
- ☐ Protect existing trees and natural habitats
- ☐ Use drought-resistant landscaping
- ☐ Conduct periodic biodiversity audits on campus
- ☐ Connect green spaces to support ecological corridors
- ☐ Introduce rain gardens or vegetated drainage areas
- ☐ Install biodiversity interpretation signs across campus
- ☐ Organise biodiversity walks, educational trails, or citizen science activities



Energy Efficiency

- ☐ Switch off lights when leaving rooms
- ☐ Maximise natural daylight use
- ☐ Unplug devices when not in use
- ☐ Use smart power strips
- ☐ Optimise thermostat settings
- ☐ Install occupancy sensors
- ☐ Use energy-efficient appliances and LED lighting
- ☐ Ensure HVAC schedules match building use
- ☐ Monitor and publicly communicate campus energy consumption
- ☐ Support smart technologies (energy dashboards, smart meters, motion sensors)
- ☐ Install or upgrade a Building Management System (BMS)
- ☐ Install heat recovery systems to reduce ventilation energy losses
- ☐ Deploy photovoltaic panels on rooftops or carports
- ☐ Transition to paperless administration (e-signatures, digital workflows)



Waste Reduction & Recycling

- | | |
|---|---|
| ☐ Provide clearly labelled recycling stations | ☐ Monitor waste by stream and track recycling and contamination rates |
| ☐ Place recycling bins beside trash bins | ☐ Separate collection points for paper, plastics, glass, metals and organics |
| ☐ Recycle electronics and batteries | ☐ Annual waste audit conducted |
| ☐ Recycle toner and printer cartridges | ☐ E-waste collection points available |
| ☐ Reuse packaging materials | |
| ☐ Establish reusable supply exchange points | |
| ☐ Minimise single-use plastics | |
| ☐ Display recycling awareness posters | |
| ☐ Organise swap events for books, clothing, or office materials | |
| ☐ Promote repair and reuse before replacement | |
| ☐ Set up a campus repair hub for electronics, textiles and furniture | |



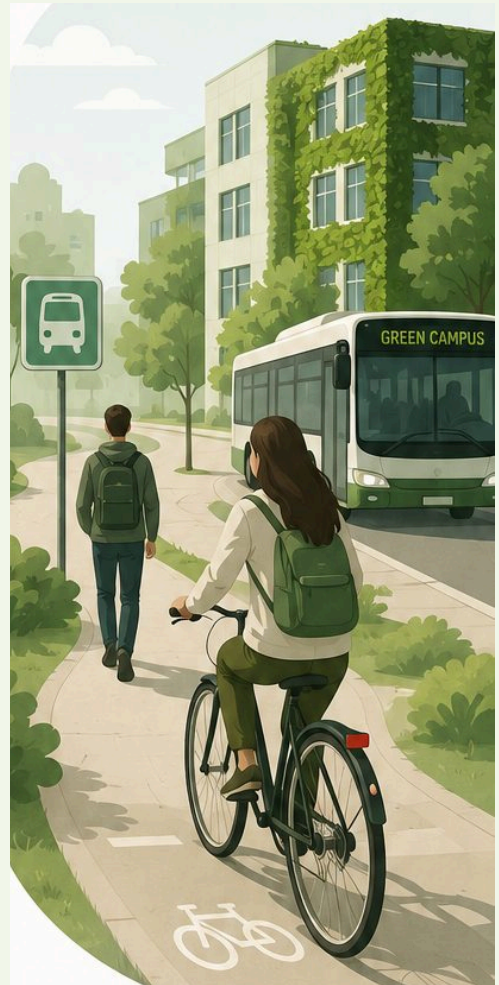
Paper & Digital Practices

- ☐ Provide clearly labelled recycling stations
- ☐ Print double-sided by default
- ☐ Use recycled paper products
- ☐ Reduce unnecessary printing
- ☐ Avoid colour printing unless necessary
- ☐ Share documents electronically
- ☐ Enable sleep mode on all devices
- ☐ Regularly declutter emails and cloud storage
- ☐ Promote digital sustainability awareness



Sustainable Transportation

- ☐ Promote carpooling among staff and students
- ☐ Encourage cycling and walking
- ☐ Provide bicycle parking facilities
- ☐ Use virtual meetings when possible
- ☐ Promote public transportation options
- ☐ Support low-carbon commuting initiatives
- ☐ Encourage train travel for Erasmus, research, and business trips when feasible
- ☐ Organise mobility challenges (Bike-to-Campus Day, Car-Free Day)
- ☐ Conduct a regular mobility survey to understand staff and student commuting patterns, inter-campus travel and main barriers to low-carbon travel
- ☐ Ensure safe, well-lit walking and cycling routes, pedestrian crossings and universal access for users with mobility constraints.
- ☐ Apply a train-before-plane policy for business and research travel



Sustainable Kitchen & Catering

- | | |
|---|--|
| ☐ Encourage reusable water bottles | ☐ Avoid single-use coffee pods |
| ☐ Provide reusable cups and utensils | ☐ Promote plant-based meal options |
| ☐ Eliminate Styrofoam products | ☐ Source food from local and seasonal suppliers |
| ☐ Reduce food waste at events | ☐ Display carbon footprint or eco-labels on canteen menus |
| ☐ Purchase food in bulk packaging | ☐ Establish food-sharing points or food donation systems |
| ☐ Use reusable food containers | ☐ Monitor and reduce food waste |
| ☐ Distribute leftover food responsibly | |



Water Conservation

- | | |
|--|---|
| ☐ Promote responsible water use | ☐ Consider rainwater harvesting where feasible |
| ☐ Install water refill stations | ☐ Install grey-water recovery systems for toilet flushing and irrigation |
| ☐ Repair water leaks promptly | ☐ Train cleaning and maintenance staff on efficient water use and non-toxic products |
| ☐ Use drought-resistant landscaping | ☐ Water consumption monitored annually |



Sustainable Procurement

- ☐ Formally adopt a green procurement policy aligned with the institution's sustainability strategy
- ☐ Purchase environmentally friendly products
- ☐ Buy products with recycled content
- ☐ Choose durable and reusable supplies
- ☐ Purchase second-hand furniture when possible
- ☐ Prioritise sustainable suppliers
- ☐ Reduce plastic packaging in purchases
- ☐ Consolidate orders to reduce transport impacts



Awareness & Engagement

- ☐ Appoint a Green Campus Representative
- ☐ Share sustainability guidelines with staff and students
- ☐ Organise biodiversity awareness events
- ☐ Create a sustainability suggestion box
- ☐ Establish a Green Office/Green Campus program
- ☐ Encourage student participation in biodiversity projects
- ☐ Monitor and report sustainability progress annually
- ☐ Include sustainability information in student and staff onboarding
- ☐ Publish annual sustainability reports
- ☐ Recognise and reward sustainability champions
- ☐ Support student-led sustainability projects
- ☐ Integrate sustainability topics into at least some study programmes
- ☐ Use the campus as a living laboratory for student and staff sustainability projects



Governance & Sustainability Management

- ☐ Appoint a University Transition Leader (UTL) or Chief Sustainability Officer
- ☐ Establish a cross-functional Sustainability Task Force
- ☐ Appoint Sustainability Ambassadors in each department or administrative unit
- ☐ Integrate sustainability into the University Strategic Plan
- ☐ Develop a formal sustainability roadmap with milestones to 2030
- ☐ Adopt and implement a PDCA (Plan–Do–Check–Act) cycle for sustainability management
- ☐ Set up a Green Dashboard to display real-time energy and resource data
- ☐ Define and track a core set of sustainability KPIs across governance, energy, waste, water, mobility and procurement
- ☐ Conduct an annual sustainability self-assessment using a structured baseline audit
- ☐ Publish annual sustainability reports accessible to the whole campus community
- ☐ Participate in external sustainability rankings (e.g. UI GreenMetric) for benchmarking
- ☐ Recognise and reward sustainability champions and high-performing departments
- ☐ Establish a Green Office or Green Campus certification programme



Reflection Questions

- Which sustainability areas are currently strongest at your institution?
- Which sustainability areas require the greatest improvement?
- Which actions could be realistically implemented within the next 12 months?
- Which actions require strategic investment, policy changes, or infrastructure development?
- Which stakeholders (students, academic staff, administration, facilities management, leadership) should be involved in implementation?
- How will progress be monitored, measured, and communicated?
- What are the three priority sustainability actions your institution will focus on during the next academic year?

The checklist is intended to support continuous improvement rather than achieve full compliance. Institutions are encouraged to revisit the checklist periodically, celebrate progress, and identify new opportunities for advancing sustainability across campus operations, teaching, research, and community engagement.

Website of the Project: hei-greenpath.eu



Contact us:

PROJECT MANAGER

University College of Enterprise and Administration in Lublin – wsipa.pl

Monika Drag – international projects specialist

Bursaki 12 street, 20-150 Lublin

e-mail: m.drag@wsipa.pl,

tel: +48 81 45 29 499

International School for Social and Business Studies (ISSBS), Slovenia – mfdps.si

Prof. Dr. Nada Trunk Širca – trunk.nada@gmail.com

Prof Dr. Valerij Dermol – valerij.dermol@gmail.com / valerij.dermol@mfdps.si

Mag. Anica Novak Trunk – anicanovak@yahoo.co.uk / anica.novak@mfdps.si

Frederick University, Cyprus – frederick.ac.cy

Dr Petroula Mavrikiou – p.mavrikiou@frederick.ac.cy

Antria Karaoli – res.ak@frederick.ac.cy

Agricultural University of Athens, Greece – aua.gr

Dr. Iordanis Chatzipavlidis, Professor – chatzipavlidis@aua.gr

Dr. Vasiliki Tsagkou, PhD Researcher – tsagouv@hotmail.com

Vera Charitou, MSc Researcher – vera.charitou@aua.gr

Pegaso International Higher Education Institution, Malta – unimedea.eu

Prof. Luigia Melillo – rector@pegasointernational.eu

Alessia Sciamanna – alessia.sciamanna@unipegaso.it

Open Access

This brochure is licensed under the terms of the Creative Commons Attribution 4.0 International License (<http://creativecommons.org/licenses/by/4.0/>), which permits use, sharing, adaptation, distribution, and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license and indicate if changes were made.

The images or other third-party material in this chapter are included in the chapter's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the chapter's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.

Declaration of generative AI and AI-assisted technologies in the writing process

During the preparation of this work the authors used ChatGPT to improve language and readability. After using this tool/service, the authors reviewed and edited the content as needed and they take full responsibility for the content of the publication.

Note on Images and Graphics: Unless otherwise indicated, all images and graphics without indicated source were generated using Artificial Intelligence (AI) tools for the purpose of this publication. Images and graphics originating from external sources are accompanied by appropriate source references. Back cover photograph used in this brochure is sourced from Pexels (www.pexels.com).

This project is co-funded with the support of the European Union (project no. 2024-1-PL01-KA220-HED-000244946). The materials developed as part of the project reflect the views only of their authors, and do not necessarily reflect the views of the European Commission and the Foundation for the Development of the Education System (National Agency). The European Commission and FRSE are not responsible for the content of the materials developed as part of the project.



Co-funded by the
Erasmus+ Programme
of the European Union