E-manual on climate neutral universities in Western Balkans

WP 2: OPTIMIZATION OF HEIs ENVIRONMENT

D2.3 E-manual on climate neutral universities in Western Balkans

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1. General description

The *Greening Relevance in Operations in Western-Balkans Tertiary-Education Habitats* (GROWTH) project bring together partners from Bosnia and Herzegovina (B&H), Montenegro, Serbia, Slovakia and Germany to elevate environmental awareness, introduce green education methodologies, and support higher education institutions in B&H and Montenegro to adopt sustainable and green practices.

The E-Manual on Climate-Neutral Universities in the Western Balkans directly supports the mission of the GROWTH Project by translating its strategic vision into a practical, action-oriented framework for university leaders and staff in Bosnia and Herzegovina and Montenegro. While GROWTH promotes environmental awareness, capacity building, and institutional transformation toward greener higher education systems, the E-Manual operationalizes these objectives by providing step-by-step guidance, tools, templates, and implementation pathways for achieving climate neutrality. It strengthens institutional readiness by embedding strategic planning, stakeholder engagement, governance reform, and measurable sustainability targets into everyday university management. In doing so, the manual advances GROWTH's core ambition: to move from conceptual commitment to concrete, systemic change that integrates sustainability into university operations, teaching, research, and long-term development strategies across the Western Balkans. Climate neutrality goes beyond isolated environmental projects; it represents a comprehensive transformation of how a university operates, teaches, conducts research, manages infrastructure, and engages with society. It requires aligning institutional strategy, governance, financial planning, and daily practices with long-term climate objectives.

At its core, climate neutrality involves three interconnected pillars. The first is measuring and reducing emissions. Universities must assess their carbon footprint across emissions from travel, procurement, waste, commuting, and other value-chain activities. This assessment establishes a baseline from which realistic and science-based reduction targets can be set. Reduction measures typically include improving energy efficiency in buildings, transitioning to renewable energy sources, modernizing heating and cooling systems, promoting sustainable mobility, reducing waste, and adopting sustainable procurement practices which is also covered through GROWTH project.

The second pillar is offsetting residual emissions. Even with ambitious mitigation measures, some emissions may remain unavoidable in the short to medium term. In such cases, universities can invest in certified carbon offset projects, such as reforestation, renewable energy development, or ecosystem restoration and this can be done through follow up projects. Offsetting should complement—not replace—direct emission reductions. A credible climate-neutral strategy prioritizes internal reductions first and uses offsets only for emissions that cannot yet be eliminated.

The third pillar is the integration of sustainability into the university's core mission. This is in GROWTH project going to be done through integration in Towards the Green University strategies.

Climate neutrality must be reflected not only in campus operations but also in teaching, research, innovation, and community engagement. Universities play a unique societal role: they educate future leaders, generate knowledge, and influence public policy. Embedding sustainability into curricula, supporting climate-related research, and fostering partnerships with local governments and businesses strengthens the broader transition to a low-carbon society. Achieving climate neutrality is a complex and long-term process which can't be achieved through one project on a short term. It requires strategic planning, cross-departmental collaboration, leadership commitment, and sustained financial investment. Institutional governance structures must clearly assign responsibilities, establish monitoring mechanisms, and ensure transparency in reporting progress. Engagement of staff, students, and external stakeholders is equally critical, as behavioural change and cultural transformation are essential components of long-term success.

From a sustainable development perspective, the higher education sectors of Bosnia and Herzegovina and Montenegro have made first step on this way, yet significant challenges remain. Both countries are advancing reforms aimed at modernizing their education systems and strengthening research capacity, while also navigating economic, infrastructural, and governance constraints. Energy systems in the region still rely heavily on fossil fuels, particularly coal in Bosnia and Herzegovina, which poses structural challenges for decarbonization. At the same time, both countries are aligning their policies with broader European Union climate objectives and the United Nations Sustainable Development Goals (SDGs). Montenegro, as an EU candidate country, and Bosnia and Herzegovina, as a potential candidate, are progressively harmonizing legislation and strategic frameworks with EU environmental acquis and climate targets. This alignment creates both obligations and opportunities for universities. Participation in European research programs, cross-border cooperation initiatives, and green funding mechanisms provides new avenues for institutional transformation.

However, fully integrating sustainability into education, research, operations, and governance remains an ongoing process. By adopting a structured approach to emission reduction, embedding sustainability into institutional planning, and fostering regional collaboration, partner universities in Bosnia and Herzegovina and Montenegro can position themselves as leaders in the green transition.

Ultimately, becoming a climate-neutral university is not only an environmental commitment but also a strategic investment in institutional resilience, competitiveness, and social responsibility. It strengthens reputation, attracts international partnerships, enhances student engagement, and contributes meaningfully to national and regional climate goals.

2. E-manual on climate neutral universities in Western Balkans

Universities in the Western Balkans are uniquely positioned to lead the transition toward climate neutrality and sustainable development in their societies. As centers of knowledge, innovation, and societal influence, higher education institutions (HEIs) in Bosnia and Herzegovina, Montenegro, and the broader region have both a responsibility and an opportunity to shape a low-carbon, resilient future. Climate change, environmental degradation, resource scarcity, and social inequality present complex challenges that demand systemic responses. Universities must therefore move beyond isolated environmental initiatives and adopt comprehensive, institution-wide strategies that integrate sustainability into governance, operations, teaching, research, and community engagement.

This Manual on Climate-Neutral Universities in the Western Balkans provides a structured and practical framework to guide HEIs in this transformation. It outlines strategic priorities, operational measures, and governance mechanisms that support measurable progress toward climate neutrality. The manual emphasizes leadership commitment and the integration of sustainability into institutional missions and visions, recognizing that meaningful change begins with clear strategic direction and accountability at the highest levels. Establishing sustainability strategies, task forces, and governance structures ensures that climate action becomes embedded within institutional culture and decision-making processes.

Operational transformation is addressed through dedicated chapters on energy efficiency, renewable energy adoption, green campus infrastructure, waste management, circular economy practices, and sustainable mobility. These areas represent significant sources of emissions and environmental impact within university campuses. By conducting energy audits, investing in renewable technologies, implementing sustainable construction standards, reducing waste, and promoting low-carbon transportation options, universities can significantly lower their carbon footprint while improving resource efficiency and reducing long-term operational costs.

Beyond infrastructure and operations, the manual underscores the importance of integrating sustainability into curriculum and research. Universities must equip students with the knowledge and skills needed to address global environmental challenges while advancing interdisciplinary research in green technologies and climate solutions. Collaboration and partnerships—at global, regional, and local levels—further enhance institutional capacity, aligning universities with international frameworks such as the United Nations Sustainable Development Goals and European green transition policies.

Environmental awareness, stakeholder engagement, compliance with national and EU regulations, financial investments, and transparent monitoring and reporting complete the framework. These components ensure accountability, regulatory alignment,

financial viability, and continuous improvement. By setting clear targets, conducting carbon footprint assessments, adopting standardized protocols, and pursuing recognized sustainability certifications, HEIs can track progress and demonstrate leadership in climate action.

This manual is designed as both a strategic guide and a practical tool. It encourages universities in the Western Balkans to adopt a holistic approach to sustainability—one that integrates environmental responsibility, social equity, economic resilience, and academic excellence. Through coordinated action, institutional commitment, and regional cooperation, universities can become catalysts for climate neutrality and sustainable development, contributing not only to their campuses but to the broader transformation of society in the Western Balkans.

3. Commitment to Sustainable Development

Achieving climate neutrality in universities is not only a technical challenge but fundamentally an organizational and cultural transformation. A strong and visible commitment to sustainable development forms the foundation for long-term success, ensuring that sustainability is integrated into all aspects of university life. This commitment requires leadership, strategic planning, institutional alignment, and active participation from all members of the academic community. In the context of Bosnia and Herzegovina and Montenegro, where higher education institutions are increasingly aligning with European sustainability objectives, establishing such a commitment is both a moral and strategic necessity.

3.1. Leadership Commitment

The first and most challenging step toward a climate-neutral university is securing robust commitment from institutional leadership. University leaders—including rectors, deans, administrative directors, and members of governance bodies—play a pivotal role in setting priorities, allocating resources, and creating an enabling environment for sustainability initiatives. Leadership commitment also extends to scientific and teaching staff, administrative personnel, technical support teams, and student representatives, all of whom are essential stakeholders in implementing sustainability policies across campus operations.

A formal declaration of climate neutrality or sustainability goals serves as a public affirmation of this commitment. Such declarations not only signal intent but also establish accountability and transparency, guiding the institution's policies, investments, and daily practices. Leadership visibility ensures that sustainability becomes embedded in decision-making processes, influencing campus planning, procurement, energy management, research priorities, and teaching methodologies.

By championing sustainability, leaders foster a culture of shared responsibility, motivating faculty, staff, and students to engage proactively in achieving climate-neutral objectives.

3.2. Incorporating Sustainability into Mission and Vision

For sustainability to take root institutionally, it must be recognized as a core value within the university's mission and vision. Embedding environmental responsibility into mission statements signals that sustainable development is not an ancillary goal but a central purpose of the institution. Universities can express this commitment through public statements, strategic documents, and institutional communications, ensuring that sustainability aligns with academic excellence, social responsibility, and regional development objectives.

Integrating sustainability into the mission and vision also helps align policies and operations with educational outcomes. It guides the design of curricula, research initiatives, and student engagement activities, promoting a holistic approach to climate action. Moreover, it strengthens the university's credibility in local, national, and international contexts, signaling to policymakers, partners, and funders that the institution is committed to long-term, systemic change. For Bosnia and Herzegovina and Montenegro, embedding sustainability into institutional identity also positions universities as leaders in regional environmental initiatives, demonstrating alignment with European Union sustainability goals and United Nations Sustainable Development Goals.

3.3. Developing a Sustainability or Green University Strategy

To move from commitment to action, universities in Bosnia and Herzegovina and Montenegro must formalize their objectives through a dedicated sustainability or "Green University" strategy. Such a strategy outlines measurable targets, operational plans, and accountability mechanisms for achieving climate neutrality. Key components typically include energy efficiency, renewable energy integration, waste reduction, water management, sustainable procurement, and comprehensive carbon footprint reduction.

The strategy should be data-driven, beginning with an assessment of current campus emissions and sustainability practices. By identifying priority areas for intervention, universities can allocate resources efficiently and monitor progress effectively. Importantly, the strategy should also establish timelines, benchmarks, and performance indicators, allowing leadership and stakeholders to track achievements and adjust plans as needed. Adopting this formal strategy transforms sustainability

from a set of individual initiatives into a coherent institutional program, ensuring that all university activities contribute toward climate-neutral goals.

In practice, GROWTH partner universities in Bosnia and Herzegovina and Montenegro have already begun preparation of these strategies and will implementing such strategies during project life time, demonstrating that formalized planning can accelerate progress. These strategies serve as models for peer institutions, highlighting effective governance structures, cross-departmental collaboration, and evidence-based decision-making in pursuit of sustainability objectives.

3.4. Creating a Sustainability Task Force

Implementation of a Green University strategy requires a dedicated, cross-functional team to guide, monitor, and support sustainability initiatives. Establishing a Sustainability Task Force brings together faculty members, administrative staff, technical personnel, students, and external experts to provide expertise, oversight, and coordination.

The task force plays a critical role in operationalizing the sustainability strategy by translating high-level goals into actionable projects, monitoring progress against established targets, and ensuring alignment with institutional priorities. Responsibilities may include: conducting energy audits, developing campus-wide campaigns, coordinating sustainable procurement, reporting on emissions, and facilitating student engagement programs. Inclusion of diverse perspectives ensures that the task force can address both technical and social aspects of sustainability, fostering innovative solutions and broad campus buy-in.

Additionally, the task force serves as a bridge between the university and external stakeholders, such as local authorities, industry partners, and international programs like the GROWTH project. By leveraging external expertise and resources, the task force strengthens institutional capacity, enhances visibility, and ensures that sustainability initiatives are resilient, scalable, and contextually relevant to the Western Balkans region.

Commitment to sustainable development is the cornerstone of climate neutrality in higher education institutions. Leadership endorsement, integration of sustainability into mission and vision, formal Green University strategies, and dedicated task forces collectively create a framework that enables universities to transition from intention to measurable action. For universities in Bosnia and Herzegovina and Montenegro, these measures not only address environmental responsibilities but also strengthen institutional capacity, enhance regional collaboration, and contribute to national and European climate goals. By institutionalizing sustainable practices, higher education institutions set a precedent for societal transformation and equip future generations

with the knowledge, skills, and values necessary to navigate and lead in a climate-constrained world.

4. Energy Efficiency and Renewable Energy

Energy use is one of the largest contributors to greenhouse gas emissions in universities, particularly in older buildings with outdated infrastructure and inefficient heating, cooling, and lighting systems. In Bosnia and Herzegovina and Montenegro, many higher education institutions face challenges related to high energy consumption, rising energy costs, and reliance on fossil fuels. Addressing these challenges through energy efficiency measures and the adoption of renewable energy sources is essential for achieving climate neutrality. By implementing systematic energy audits, adopting green technologies, and integrating renewable energy systems, universities can reduce their carbon footprint, lower operational costs, and create healthier and more sustainable learning environments.

4.1. Energy Audits

A critical first step in improving energy efficiency is conducting comprehensive **energy audits** across all university facilities. An energy audit provides a detailed assessment of current energy consumption, identifies inefficiencies, and pinpoints areas where energy savings can be realized.

Audits typically involve:

- **Building envelope analysis** – assessing insulation, windows, doors, and roof structures to identify heat loss and opportunities for retrofitting.
- **Lighting and appliance evaluation** – reviewing the efficiency of lighting systems, office equipment, laboratory instruments, and common-area appliances.
- **Heating, ventilation, and air conditioning (HVAC) systems** – analyzing energy use patterns, equipment efficiency, and maintenance practices.
- **Water heating and circulation systems** – evaluating efficiency and potential for renewable heating integration.
- **Campus-wide infrastructure** – identifying energy losses in distribution systems, including boilers, chillers, and electrical panels.

Energy audits provide universities with data-driven insights and a baseline for setting realistic, measurable energy reduction targets. The audit process should be repeated periodically to track improvements and ensure that energy-saving measures remain

effective. Universities can engage internal technical teams or external energy consultants to perform these audits. Additionally, involving students and faculty in audit activities can enhance awareness and build capacity in energy management.

4.2. Adoption of Renewable Energy Sources

Reducing dependence on fossil fuels is a cornerstone of climate neutrality. Integrating **renewable energy sources** such as solar, wind, or geothermal systems into campus operations can significantly lower carbon emissions while providing financial and educational benefits.

Solar Energy: Solar photovoltaic (PV) panels are one of the most accessible and scalable renewable energy options for universities. They can be installed on rooftops, carports, or open land within campus boundaries. Solar energy can provide electricity for lighting, appliances, laboratory equipment, and charging stations for electric vehicles.

Wind Energy: In regions with adequate wind potential, small to medium-scale wind turbines can supplement campus electricity supply. While wind energy requires more planning and initial investment, it can be a reliable and renewable energy source in combination with other technologies.

Geothermal Systems: Geothermal heating and cooling systems harness energy stored in the earth to regulate building temperatures efficiently. These systems are especially effective for large buildings with consistent heating and cooling needs, providing a low-carbon alternative to traditional boilers and air conditioning systems.

Integration Considerations: When adopting renewable energy, universities should evaluate energy demand profiles, space availability, local climate conditions, and economic feasibility. Combining renewable energy with energy storage solutions, such as batteries, can enhance reliability and allow campuses to manage energy use more efficiently. Renewable energy projects also offer opportunities for research, innovation, and hands-on student learning.

4.3. Energy-saving Technologies

In addition to generating renewable energy, universities can dramatically reduce energy consumption through **energy-saving technologies** and modern building management systems.

Lighting Upgrades: Replacing incandescent or fluorescent lighting with **LED fixtures** is a highly effective measure, as LEDs consume up to 75% less energy and have longer

lifespans. Implementing motion sensors and automated controls ensures lights are only on when needed, further reducing energy waste.

Efficient HVAC Systems: Retrofitting heating and cooling systems with energy-efficient models, programmable thermostats, and zoning controls can reduce energy consumption significantly. Regular maintenance of HVAC systems, combined with monitoring tools, ensures consistent performance and prevents energy loss.

Smart Building Systems: Advanced building management systems (BMS) allow real-time monitoring of energy use across the campus. These systems can automate lighting, heating, and cooling, detect inefficiencies, and provide actionable data for energy managers. Smart meters and energy dashboards can also engage staff and students by making energy consumption visible and fostering a culture of responsibility.

Water and Appliance Efficiency: Installing low-flow faucets, water heaters with timers, and energy-efficient laboratory and kitchen equipment further reduces energy and water consumption. Even minor efficiency improvements, when scaled across an entire campus, can result in substantial energy and cost savings.

Energy efficiency and renewable energy are key pillars of a climate-neutral university. Conducting regular energy audits provides the knowledge necessary to identify opportunities for savings, while adopting renewable energy sources reduces reliance on fossil fuels and lowers carbon emissions. Complementing these measures with energy-saving technologies, including LED lighting, efficient HVAC systems, and smart building management, ensures that campuses operate sustainably and cost-effectively. For universities in Bosnia and Herzegovina and Montenegro, these strategies not only advance climate neutrality but also create healthier learning environments, reduce operational costs, and provide practical platforms for student engagement, research, and innovation in the field of sustainable energy. By embedding these practices into campus culture and long-term planning, higher education institutions can play a leading role in the regional transition toward a low-carbon, sustainable future.

5. Green Campus Infrastructure

A climate-neutral university requires not only energy-efficient operations but also sustainable campus infrastructure that reduces environmental impact while enhancing the quality of life for students, staff, and the surrounding community. Green campus infrastructure integrates environmental considerations into the design, construction, renovation, and management of university facilities. By implementing sustainable construction practices, promoting biodiversity through landscaping, and fostering eco-

friendly campus spaces, universities in Bosnia and Herzegovina and Montenegro can create resilient, low-carbon environments that align with global sustainability goals.

5.1. Sustainable Construction and Renovation

Sustainable construction and renovation are critical components of a green campus. When universities plan new buildings or upgrade existing structures, adhering to recognized **green building standards**—such as **LEED (Leadership in Energy and Environmental Design)**—ensures that environmental, social, and economic considerations are embedded into the design process.

Key Principles of Sustainable Construction:

- **Environmentally Friendly Materials:** Selecting construction materials with low embodied carbon, high recyclability, and minimal chemical pollutants reduces the environmental footprint of buildings. Locally sourced materials also decrease transportation-related emissions.
- **Energy-Efficient Design:** Proper insulation, high-performance windows, and airtight building envelopes minimize energy loss. Buildings should be oriented to optimize natural light and passive heating and cooling, reducing reliance on mechanical systems.
- **Water Efficiency:** Installing water-saving fixtures, rainwater harvesting systems, and greywater recycling supports sustainable water management.
- **Indoor Environmental Quality:** Sustainable construction prioritizes good air quality, natural lighting, thermal comfort, and acoustic control, contributing to occupant health and productivity.
- **Lifecycle Approach:** Green building design considers the full lifecycle of a structure—from planning and construction to operation, maintenance, and eventual decommissioning—ensuring long-term sustainability and cost-effectiveness.

Renovations provide significant opportunities for improving the energy efficiency of older campus buildings. Retrofitting heating, ventilation, and cooling systems, upgrading lighting, enhancing insulation, and modernizing windows can dramatically reduce energy consumption and operational costs. Sustainable renovation projects also present opportunities to integrate renewable energy systems and smart building management technologies. For universities in Bosnia and Herzegovina and Montenegro, where many campuses have older infrastructure, targeted renovations aligned with green building principles can yield significant environmental and economic benefits.

5.2. Green Landscaping

In addition to sustainable buildings, **green landscaping** is essential for creating climate-resilient and biodiverse campuses. Landscaping practices influence local microclimates, water management, air quality, and campus aesthetics, making them a vital aspect of a university's sustainability strategy.

Key Approaches to Green Landscaping:

- **Biodiversity Promotion:** Planting native species, creating pollinator gardens, and developing green corridors support local wildlife, enhance ecosystem services, and strengthen the resilience of campus ecosystems. Biodiverse landscapes can also provide living laboratories for research and student engagement.
- **Tree Planting and Shade:** Trees provide natural cooling, reduce the urban heat island effect, and sequester carbon. Strategically planting trees along pathways and open spaces enhances comfort and encourages outdoor activities.
- **Sustainable Water Management:** Implementing rain gardens, permeable surfaces, and bioswales helps manage stormwater, prevent flooding, and reduce strain on municipal drainage systems. Efficient irrigation systems and drought-resistant native plants reduce water consumption.
- **Outdoor Learning and Recreation Spaces:** Green spaces can double as venues for outdoor learning, student recreation, and social interaction, creating a healthier campus environment while promoting sustainability awareness.
- **Maintenance Practices:** Minimizing chemical fertilizers and pesticides, using composting, and applying organic soil amendments support soil health and reduce environmental pollution.

Green landscaping initiatives also serve as a visible demonstration of the university's commitment to sustainability. They can inspire students and staff, promote environmental stewardship, and strengthen the institution's identity as a leader in climate action. In Bosnia and Herzegovina and Montenegro, campuses have unique opportunities to integrate native flora and culturally significant landscaping elements, reflecting both ecological and social sustainability.

5.3. Integrating Green Infrastructure into Campus Planning

A truly sustainable campus combines green construction, energy-efficient systems, and landscaped areas into a cohesive **master plan**. Integration ensures that buildings, open spaces, transportation networks, and utilities work synergistically to minimize environmental impact. Universities should consider:

- **Site Selection and Orientation:** Positioning new buildings to maximize sunlight exposure, natural ventilation, and access to public transport reduces energy use and supports low-carbon mobility.

- **Multi-functional Green Spaces:** Designing courtyards, gardens, and rooftop gardens that provide ecosystem services, outdoor classrooms, and social spaces enhances both sustainability and campus life.
- **Connectivity and Accessibility:** Green infrastructure planning should encourage walking and cycling, linking buildings with shaded pathways and safe bicycle lanes.
- **Monitoring and Adaptive Management:** Installing environmental monitoring systems, such as soil moisture sensors, smart irrigation, and energy monitoring dashboards, allows universities to manage resources efficiently and adapt infrastructure strategies over time.

By integrating sustainable construction, renovation, and landscaping into a unified campus design, universities not only reduce their environmental impact but also create resilient, functional, and aesthetically appealing campuses. Green infrastructure contributes to climate adaptation, supports carbon reduction strategies, and improves the overall quality of education and research environments.

Green campus infrastructure is a cornerstone of climate-neutral universities. Through sustainable construction and renovation, universities can reduce operational energy demand, lower carbon emissions, and enhance indoor environmental quality. Complementary green landscaping practices foster biodiversity, manage water sustainably, and create attractive, functional outdoor spaces that promote wellbeing and learning. When integrated into a strategic campus planning approach, these measures help universities in Bosnia and Herzegovina and Montenegro achieve climate neutrality while serving as models of environmental stewardship, resilience, and innovation. Implementing green campus infrastructure not only supports the institution's sustainability goals but also provides practical learning opportunities, strengthens community engagement, and positions universities as leaders in the regional transition toward a low-carbon, sustainable future.

6. Waste Management and Circular Economy

Waste management and the circular economy are central to creating climate-neutral, sustainable universities. Higher education institutions generate significant volumes of waste across their operations, from administrative offices and laboratories to cafeterias and dormitories. Poorly managed waste contributes to greenhouse gas emissions, pollution, and resource depletion. By adopting comprehensive waste reduction strategies, sustainable procurement practices, and circular economy principles, universities in Bosnia and Herzegovina and Montenegro can reduce their environmental footprint, lower operational costs, and demonstrate leadership in sustainability. These strategies not only improve environmental performance but also

provide educational opportunities and foster a culture of resource responsibility among students, staff, and the broader community.

6.1. Waste Reduction

The first step toward sustainable waste management is **waste reduction**, which focuses on minimizing the amount of waste generated at its source and ensuring proper segregation and disposal. Universities can implement several key strategies:

Segregation Systems: Establishing clearly labeled recycling, composting, and general waste bins across campuses encourages proper disposal and facilitates the recycling of materials such as paper, plastics, glass, metals, and organic waste. Signage and educational campaigns increase awareness and participation, while centralized collection points improve efficiency.

Composting: Organic waste from cafeterias, food courts, and campus gardens can be collected and converted into compost. Composting reduces methane emissions from landfill disposal and produces nutrient-rich soil for campus landscaping, gardens, or research projects. Students and staff can be involved in monitoring composting operations, providing hands-on learning experiences in sustainable waste management.

Reducing Single-Use Plastics: Phasing out single-use plastics, such as disposable bottles, cutlery, cups, and packaging, is a highly visible and impactful measure. Universities can encourage the use of reusable water bottles, cups, and cutlery by installing refill stations, offering incentives, and integrating sustainable behavior into campus policies. Transitioning to biodegradable alternatives or bulk packaging for consumables further reduces plastic waste.

Digitalization: Minimizing paper use by adopting digital solutions for administration, learning management systems, and examination procedures can reduce paper waste. Encouraging staff and students to shift to electronic communication and submission of assignments lowers demand for printing and contributes to resource conservation.

Implementing these measures requires engagement and communication across the campus. Regular workshops, awareness campaigns, and competitions can motivate participation, while monitoring waste volumes over time allows institutions to measure progress and refine strategies.

6.2. Sustainable Procurement

Sustainable procurement is a crucial component of both waste reduction and circular economy practices. Universities make substantial purchases of products ranging from

office supplies and laboratory equipment to food and furniture, and these choices have significant environmental and social impacts.

Key Principles of Sustainable Procurement:

- Eco-Friendly Products: Prioritize products made from recycled materials, with low environmental impact, and that meet recognized environmental certifications (e.g., FSC for paper products, energy-efficient electronics).
- Supplier Evaluation: Select suppliers who demonstrate sustainability practices, such as reduced packaging, ethical sourcing, or energy-efficient production. Contracts should encourage or require environmentally responsible practices.
- Food Procurement: Campus dining facilities can source sustainably produced food, including locally sourced and organic options. Reducing food packaging and offering plant-based meals can lower the carbon footprint of campus food services.
- Furniture and Equipment: Opt for durable, modular, or refurbished furniture and laboratory equipment to extend product lifecycles. Modular design allows future upgrades without discarding the entire item, reducing material consumption.

Sustainable procurement reinforces the university's commitment to circular economy principles by prioritizing products that can be reused, recycled, or disposed of responsibly. Policies and procurement guidelines should be formally adopted, communicated to departments, and supported by monitoring and reporting on supplier compliance.

6.3. Encouraging Circular Economy Practices

A circular economy approach focuses on keeping materials and products in use for as long as possible through reuse, refurbishment, recycling, and redesign, reducing demand for virgin resources and minimizing waste generation. Universities can adopt a wide range of circular practices:

Reuse and Refurbishment: Furniture, laboratory equipment, and electronics can be refurbished and reused instead of purchasing new items. Implementing on-campus repair workshops or collaborations with local repair businesses allows resources to be extended and waste minimized. Students can participate in refurbishment projects, providing practical experience in sustainability and engineering skills.

Composting and Organic Recycling: Food waste can be converted into compost for campus gardens, landscaping, or educational projects. Organic waste management

contributes to soil health, reduces landfill emissions, and provides a visible example of circularity.

Reducing Single-Use Items: Replacing disposable cups, plates, and cutlery with reusable alternatives is a simple yet effective measure. Campus cafeterias can introduce reusable trays, encourage students to bring reusable containers, and integrate dishwashing systems to manage hygiene efficiently.

Recycling and Resource Recovery: Establishing robust recycling systems ensures that paper, plastics, metals, and glass are collected, sorted, and sent to certified recycling facilities. Partnerships with local recycling companies can improve logistics, lower costs, and ensure compliance with national waste regulations.

Educational Integration: Circular economy initiatives provide learning and research opportunities. Universities can integrate waste reduction and material reuse into curricula, student projects, and research programs. Demonstration projects, such as a campus zero-waste challenge or a circular lab program, allow students to apply sustainability principles in real-life contexts.

6.4. Institutionalizing Waste and Circular Practices

For waste management and circular economy initiatives to be effective, they must be formalized within university policy and governance structures. This includes:

- **Strategic Plans:** Integrating waste reduction and circular economy objectives into broader sustainability strategies, with measurable targets for waste diversion, recycling rates, and resource efficiency.
- **Task Forces and Committees:** Engaging cross-functional teams of staff, students, and external experts to oversee implementation, monitor progress, and provide recommendations.
- **Monitoring and Reporting:** Establishing tracking systems for waste volumes, recycling rates, and composting output to evaluate success and identify improvement opportunities.
- **Incentives and Engagement:** Encouraging student and staff participation through incentives, awareness campaigns, competitions, and recognition programs strengthens cultural adoption of circular practices.

Institutionalizing these practices ensures continuity, builds capacity, and enhances accountability. By embedding circular economy principles into daily operations, universities not only reduce environmental impact but also model sustainable behaviors for students, staff, and the wider community.

Waste management and circular economy practices are essential pillars of climate-neutral universities. Through waste reduction, sustainable procurement, and circular resource management, universities in Bosnia and Herzegovina and Montenegro can significantly reduce their environmental footprint, lower operational costs, and create resilient campus systems. By combining practical infrastructure solutions with education, engagement, and governance, higher education institutions can foster a culture of sustainability, demonstrating leadership in the regional transition toward a low-carbon, circular economy. Integrating these practices into campus life not only supports climate neutrality but also equips students with knowledge and skills to lead sustainable transformations in society.

7. Sustainable Mobility

Transportation is a significant contributor to the carbon footprint of higher education institutions. Commuting by staff, students, and visitors, as well as campus fleet operations, can generate substantial greenhouse gas emissions. In the Western Balkans, including Bosnia and Herzegovina and Montenegro, urban congestion, reliance on private vehicles, and limited public transit options pose additional challenges. Developing a sustainable mobility strategy is therefore essential for universities aiming for climate neutrality. By promoting green transportation options, facilitating carpooling, and integrating shared mobility solutions, universities can significantly reduce emissions, improve air quality, and foster healthier, more active campus communities.

7.1. Green Transportation

Green transportation focuses on reducing emissions through sustainable commuting and the adoption of low-carbon vehicle technologies. Universities can implement a combination of strategies to encourage staff, students, and visitors to shift away from high-emission travel methods:

Public Transport Incentives: Subsidizing public transit for students and staff encourages the use of buses, trams, or trains instead of private cars. Universities can partner with local transit authorities to provide discounted monthly or semester passes, integrated route information, and flexible schedules aligned with class times.

Cycling and Walking Infrastructure: Encouraging active mobility on campus has both environmental and health benefits. Universities can develop safe and accessible walking paths, bike lanes, and secure bicycle parking. Additional support can include bike rental or bike-sharing programs, maintenance stations, and incentives such as “bike-to-campus” days or rewards for regular cycling commuters.

Electric Vehicle Integration: Installing charging stations for electric vehicles (EVs) supports the transition to low-carbon transportation for staff, students, and campus fleets. EV infrastructure encourages adoption by reducing range anxiety and demonstrating institutional commitment to sustainable energy. Universities can prioritize EVs for campus fleet vehicles and incentivize staff to switch to electric cars through parking privileges, discounted charging, or recognition programs.

Campus Planning for Sustainable Access: Designing the campus to prioritize pedestrian and cycling access over car traffic reduces emissions while enhancing safety and campus aesthetics. Limiting private vehicle access, creating pedestrian-only zones, and integrating green corridors make active mobility more attractive.

Implementing these green transportation measures requires coordination with local authorities, campus planners, and student organizations. Universities can also leverage technology, such as apps for route planning, real-time transit updates, and bike-sharing management, to make sustainable commuting more convenient and appealing.

7.2. Carpooling and Shared Mobility Programs

Carpooling and shared mobility solutions further reduce the number of single-occupancy vehicles on campus, decreasing emissions, congestion, and parking demand.

Carpooling Programs: Universities can establish formal carpooling platforms or partner with existing apps that connect students and staff traveling similar routes. Incentives such as preferential parking, reserved spots, or recognition programs encourage participation. Carpooling reduces fuel consumption, lowers commuting costs, and fosters a sense of community among participants.

Shared E-Bikes and E-Scooters: Shared micro-mobility solutions, such as electric bikes and scooters, provide flexible and low-carbon transport options for short campus trips or nearby commutes. Universities can establish station-based or dockless sharing systems and integrate them with campus maps and mobile applications. Offering affordable membership rates or including shared mobility access as part of student services can increase uptake.

Integration with Public Transport: Combining carpooling and shared mobility with public transport creates a comprehensive multimodal network. For example, students may take a bus from home to campus and then use shared bikes or e-scooters to reach specific buildings or research centers. Coordination of these modes minimizes reliance on private cars and maximizes overall efficiency.

Monitoring and Incentives: Tracking participation in carpooling and shared mobility programs allows universities to measure emissions reductions and identify areas for improvement. Providing recognition, rewards, or gamified challenges motivates users and helps build a culture of sustainable commuting on campus.

7.3. Benefits of Sustainable Mobility

Adopting sustainable mobility practices brings multiple environmental, economic, and social benefits:

- **Environmental Impact:** Reduced greenhouse gas emissions and air pollution contribute directly to climate neutrality goals. Lower reliance on fossil fuels supports regional climate targets and improves urban air quality.
- **Cost Savings:** Decreased fuel consumption, reduced parking infrastructure needs, and lower fleet operational costs translate into significant financial savings for universities.
- **Health and Wellbeing:** Encouraging walking, cycling, and active mobility improves physical health, reduces stress, and promotes mental wellbeing among students and staff.
- **Campus Culture:** Sustainable mobility initiatives foster environmental awareness, behavioral change, and a culture of responsibility. Visibility of green commuting programs strengthens the university's sustainability identity and reputation.

For universities in Bosnia and Herzegovina and Montenegro, sustainable mobility solutions also enhance access to education by reducing transportation barriers and providing affordable commuting alternatives for students and staff, particularly in regions with limited public transport coverage.

Sustainable mobility is one of a key pillar of climate-neutral universities. By promoting green transportation, carpooling, and shared mobility, universities in Bosnia and Herzegovina and Montenegro can reduce the carbon footprint of commuting, lower operational costs, and foster healthier, more connected campus communities. Integrating these strategies into broader sustainability planning, providing infrastructure and incentives, and engaging students and staff ensures long-term success. Beyond reducing emissions, sustainable mobility initiatives create opportunities for learning, innovation, and social engagement, positioning universities as leaders in the regional transition to low-carbon, climate-resilient campuses.

8. Curriculum and Research Integration

Higher education institutions play a critical role in fostering sustainable development, not only through campus operations but also through **education and research**. By embedding sustainability into curricula, promoting interdisciplinary learning, and advancing research in green technologies, universities equip students with the knowledge, skills, and mindset to address global and regional sustainability challenges. In Bosnia and Herzegovina and Montenegro, integrating sustainability into higher education ensures that graduates are prepared to contribute to national climate goals, innovation in sustainable industries, and broader societal transitions toward low-carbon economies.

8.1. Incorporating Sustainability in Education

Sustainability-focused education enables universities to shape future leaders, professionals, and researchers capable of responding to climate change and environmental challenges. Many HEIs in EU have introduced courses, programs, and even entire degrees dedicated to sustainability, renewable energy, climate science, environmental policy, and sustainable business practices. Incorporating sustainability into education includes:

- **Dedicated Degree Programs:** Universities can offer undergraduate and graduate programs in environmental science, renewable energy, sustainable agriculture, climate policy, and green technologies.
- **Elective and Minor Courses:** Introducing elective courses in sustainability across disciplines, such as engineering, economics, urban planning, and health sciences, ensures that students from all backgrounds gain exposure to sustainability principles.
- **Experiential Learning Opportunities:** Practical learning methods, including internships, field projects, lab experiments, and community-based initiatives, allow students to apply theory to real-world sustainability challenges.
- **Global Competency Development:** By including sustainability in education, universities help students understand international climate agreements, UN Sustainable Development Goals, and European Union green policy frameworks.

Embedding sustainability into education ensures that students not only understand environmental challenges but are also capable of generating innovative solutions, advocating for policy change, and fostering sustainable practices in their communities and workplaces.

8.2. Sustainability in Curriculum

Beyond dedicated programs, universities can integrate sustainability across **all curricula**, ensuring that environmental awareness is a fundamental part of higher education. This approach embeds sustainable thinking into a wide array of disciplines, from engineering and business to social sciences and arts.

Strategies for Integrating Sustainability:

- **Interdisciplinary Modules:** Introduce sustainability-focused modules within existing courses. For instance, business students may study sustainable supply chains, engineers may learn about renewable energy design, and urban planning students may explore climate-resilient cities.
- **Capstone Projects and Theses:** Encourage students to focus research projects and dissertations on sustainability topics, fostering problem-solving and innovation. Capstone projects can involve collaboration with local communities, municipalities, or industry partners.
- **Service Learning and Community Engagement:** Integrating sustainability into courses through community engagement projects reinforces practical application and societal impact. Students can contribute to local waste management programs, renewable energy installations, or biodiversity restoration projects.
- **Faculty Development:** Ensuring that instructors are trained in sustainability concepts enables effective integration of content into their teaching. Workshops, seminars, and collaboration with international partners can enhance faculty capacity.

In Bosnia and Herzegovina and Montenegro, integrating sustainability into curricula strengthens the relevance of higher education to societal needs, aligns with EU green transition objectives, and prepares students for emerging green jobs in regional and global markets.

8.3. Research in Green Technologies

Universities serve as centers for innovation, making **research in green technologies** a key pillar of climate-neutral strategies. Advancing knowledge in renewable energy, sustainable agriculture, climate adaptation, and low-carbon technologies supports both national policy objectives and global sustainability goals.

Key Areas for Research:

- **Renewable Energy Technologies:** Research on solar, wind, hydro, and biomass energy can optimize energy efficiency, reduce costs, and increase adoption of clean energy systems. Campus facilities can serve as pilot sites for testing and demonstration projects.
- **Sustainable Agriculture and Food Systems:** Investigating low-impact farming practices, soil management, water conservation, and agroecology contributes to climate-resilient food production and rural development.
- **Climate Change Solutions:** Universities can study adaptation strategies for local and regional climates, urban heat mitigation, carbon sequestration, and disaster risk reduction.
- **Green Materials and Circular Economy Technologies:** Researching sustainable building materials, recycling processes, and waste-to-resource technologies promotes circular economy principles and supports campus sustainability initiatives.

Research activities should prioritize applied outcomes, enabling technologies and practices that can be implemented on campus, in local communities, or in collaboration with industry partners. Encouraging student participation in research projects enhances learning and develops practical problem-solving skills.

8.4. Promoting Interdisciplinary Research

Sustainability challenges are complex, spanning energy, agriculture, health, technology, infrastructure, and social systems. To address these multifaceted issues, HEIs must **promote interdisciplinary research**, fostering collaboration across departments and faculties.

Approaches to Interdisciplinary Research:

- **Collaborative Research Centers:** Establish university centers dedicated to sustainability that bring together engineering, natural sciences, economics, social sciences, and humanities faculty to work on integrated solutions.
- **Joint Research Projects:** Encourage cross-faculty projects on topics like smart cities, renewable energy systems, or climate-resilient rural development. Joint funding applications to national or EU programs can support large-scale initiatives.
- **Integration of Policy and Practice:** Partner with local governments, NGOs, and industries to ensure research addresses real-world challenges, facilitates knowledge transfer, and contributes to sustainable development in the region.

- **Student Involvement in Interdisciplinary Research:** Graduate and undergraduate students can participate in interdisciplinary projects, gaining exposure to collaborative problem-solving and innovation methods.

Interdisciplinary research strengthens universities' capacity to develop comprehensive, scalable solutions to sustainability challenges. It also enhances institutional visibility, attracts funding, and positions HEIs as thought leaders in climate action and green technology innovation.

8.5. Linking Curriculum and Research

Curriculum and research integration ensures that teaching is informed by the latest scientific knowledge, and research benefits from student involvement and practical application. Universities can achieve this through:

- **Research-Infused Teaching:** Incorporating faculty research projects into classroom activities allows students to engage with cutting-edge sustainability challenges.
- **Student-Led Research Initiatives:** Encouraging students to initiate research projects or participate in ongoing sustainability studies fosters innovation, critical thinking, and practical skill development.
- **Campus as a Living Lab:** Using the university campus as a testbed for research projects, such as renewable energy installations, green infrastructure, and waste management experiments, bridges theory and practice.

By integrating research into curricula, universities cultivate an ecosystem where knowledge creation, learning, and sustainability action reinforce each other. Students graduate with not only theoretical understanding but also hands-on experience and the ability to apply sustainability solutions in diverse contexts.

Integrating sustainability into education and research is fundamental for climate-neutral universities. By embedding environmental principles into curricula, offering specialized sustainability programs, and fostering interdisciplinary research in green technologies, higher education institutions in Bosnia and Herzegovina and Montenegro can develop capable graduates and innovative solutions to regional and global sustainability challenges. Linking research and teaching through experiential learning, living labs, and collaborative projects ensures that knowledge is applied, measurable, and impactful. Curriculum and research integration positions universities as engines of change, advancing climate action, promoting a sustainable workforce, and contributing meaningfully to the green transition in the Western Balkans.

9. Collaboration and Partnerships

Achieving climate neutrality is not a task that universities can accomplish in isolation. Sustainability challenges—climate change, biodiversity loss, resource depletion, and social inequality—are complex and interconnected, requiring cooperation across institutions, sectors, and borders. For HEIs in Bosnia and Herzegovina and Montenegro, collaboration and partnerships are essential to accelerate progress, share knowledge, access funding, and strengthen institutional capacity.

By actively engaging in global sustainability initiatives, building strong local and regional partnerships, and embedding principles of social equity into sustainability strategies, universities can enhance their impact while contributing to broader societal transformation. Collaboration ensures that climate-neutral ambitions are supported by shared expertise, joint innovation, and inclusive approaches that reflect the social realities of the Western Balkans.

9.1. Networking with Global Sustainability Initiatives

Participation in global sustainability frameworks and networks strengthens institutional credibility, aligns university strategies with international standards, and opens access to research funding and capacity-building opportunities.

9.1.1. Alignment with the United Nations Sustainable Development Goals(SDGs)

The United Nations Sustainable Development Goals provide a comprehensive framework for sustainable development, including goals related to climate action (SDG 13), affordable and clean energy (SDG 7), responsible consumption and production (SDG 12), and quality education (SDG 4). Universities in Bosnia and Herzegovina and Montenegro can align their teaching, research, and operational strategies with the SDGs by:

- Mapping institutional activities against relevant SDGs
- Reporting on SDG contributions in annual sustainability reports
- Embedding SDG-related topics in curricula and research agendas
- Participating in SDG-focused academic networks and forums

Aligning with the SDGs enhances transparency, facilitates benchmarking, and positions universities as contributors to global sustainability efforts.

9.1.2. Engagement with European Higher Education Networks

Collaboration with European academic bodies strengthens regional integration and supports alignment with EU sustainability priorities. Engagement with organizations such as the European University Association (EUA) enables HEIs to exchange best practices, participate in policy discussions, and access sustainability-focused guidance and frameworks.

Similarly, alignment with the European Commission's Green Deal objectives supports integration into the broader European green transition. By aligning campus strategies with EU climate neutrality targets, universities enhance their eligibility for funding under programs such as Erasmus+, Horizon Europe, and other EU-supported initiatives.

9.1.3. Participation in International Research and Innovation Platforms

Global collaboration expands research opportunities and strengthens interdisciplinary innovation. Participation in international research consortia enables HEIs to contribute to and benefit from knowledge exchange in renewable energy, climate adaptation, green technologies, and sustainable urban development.

Networking at the international level also facilitates:

- Joint research proposals
- Mobility programs for students and faculty
- Shared digital platforms for sustainability data
- Cross-border pilot projects and living labs

Through international partnerships, universities in Bosnia and Herzegovina and Montenegro gain exposure to innovative practices and strengthen their capacity to implement climate-neutral strategies effectively.

9.2. Local and Regional Partnerships

While global engagement is important, climate neutrality must also be grounded in local realities. Collaboration with local and regional stakeholders ensures that sustainability strategies are contextually relevant and socially inclusive.

9.2.1. Partnerships with Municipalities

Universities can work closely with local governments to support sustainable urban planning, energy efficiency initiatives, waste management systems, and public transportation improvements. Joint projects may include:

- Developing climate action plans
- Conducting energy audits of public buildings
- Supporting smart city initiatives
- Implementing tree-planting and biodiversity projects

Universities can provide scientific expertise and technical support, while municipalities offer real-world implementation opportunities. This collaboration strengthens the role of HEIs as knowledge hubs and problem-solving institutions within their communities.

9.2.2. Cooperation with Environmental NGOs

Environmental non-governmental organizations (NGOs) play a critical role in raising awareness, mobilizing communities, and advocating for policy change. Universities can partner with NGOs to:

- Organize sustainability campaigns
- Conduct environmental education programs
- Implement community-based climate adaptation projects
- Promote zero-waste initiatives

Such partnerships enhance student engagement and provide experiential learning opportunities. They also strengthen civic participation and environmental awareness in the broader community.

9.2.3. Regional Academic Cooperation

Collaboration among universities in Bosnia and Herzegovina and Montenegro fosters shared learning and resource efficiency. Joint sustainability networks within the Western Balkans can support:

- Exchange of best practices in green campus development
- Shared research infrastructure
- Regional sustainability conferences and workshops

- Collaborative funding proposals

Regional partnerships create economies of scale, enhance visibility, and build a stronger collective voice in international sustainability dialogues.

9.3. Social Equity

Sustainability extends beyond environmental protection; it includes a strong commitment to social equity, diversity, and inclusion. Climate neutrality must be pursued in ways that promote fairness, reduce inequalities, and ensure equal access to opportunities.

9.3.1. Equity and Inclusion in Sustainability Policies

Universities must ensure that sustainability strategies do not disproportionately affect vulnerable groups. For example:

- Transportation policies should consider affordability and accessibility.
- Energy-efficiency upgrades in student housing should maintain reasonable living costs.
- Sustainability programs should include representation from diverse student and staff groups.

Inclusive governance structures—such as sustainability councils that include student and staff representatives—ensure that decision-making reflects diverse perspectives.

9.3.2. Education for Social Justice

HEIs play a key role in promoting social justice through teaching and research. Courses and programs can address topics such as environmental justice, equitable resource distribution, gender equality in climate policy, and inclusive urban development. Integrating these themes ensures that graduates understand the social dimensions of sustainability.

9.3.3. Community Outreach and Policy Advocacy

Universities can contribute to reducing inequality through outreach programs that support marginalized communities. Initiatives may include:

- Providing sustainability training for local schools
- Supporting green entrepreneurship in rural areas
- Offering policy advice to governments on equitable climate transition

By advocating for inclusive and socially responsible climate policies, universities reinforce their role as agents of positive societal transformation.

Collaboration and partnerships are fundamental pillars of climate-neutral universities in the Western Balkans. By engaging with global sustainability initiatives, universities in Bosnia and Herzegovina and Montenegro align themselves with international standards and expand their access to expertise and funding. Through local and regional partnerships, they ensure that sustainability strategies are grounded in community needs and regional priorities. By embedding social equity into sustainability efforts, they promote inclusive development and address the interconnected challenges of climate change and inequality.

Strong networks, shared knowledge, and inclusive collaboration enable universities to amplify their impact beyond campus boundaries. Through strategic partnerships, HEIs become catalysts for environmental innovation, social justice, and sustainable development in the Western Balkans and beyond.

10. Environmental Awareness and Engagement

Environmental awareness and active engagement are essential components of climate-neutral universities. While infrastructure upgrades and policy frameworks are critical, long-term transformation depends on people—students, academic staff, administrative personnel, technical teams, alumni, and local communities. Universities in Bosnia and Herzegovina and Montenegro must therefore foster a culture of sustainability that empowers individuals to take responsibility and actively participate in environmental initiatives.

By investing in training and capacity building, strengthening stakeholder engagement, promoting behavioral change, pursuing green certifications, and organizing sustainability-focused events, higher education institutions can embed sustainability into everyday campus life and institutional identity.

10.1. Training and Capacity Building

Capacity building is fundamental for ensuring that sustainability strategies are effectively implemented and continuously improved. Universities must equip students, faculty, and staff with the knowledge and skills needed to contribute meaningfully to environmental objectives.

10.1.1. Training for Students

Students are key drivers of change. Universities can enhance student capacity through:

- Sustainability-focused workshops and seminars on climate change, circular economy, energy efficiency, and sustainable consumption.
- Leadership development programs that empower students to lead green initiatives on campus and in their communities.
- Sustainability certification courses, enabling students to gain formal recognition of competencies in environmental management or sustainable development.
- Support for sustainability-focused student clubs and organizations, which provide practical engagement opportunities and encourage peer-to-peer learning.

These initiatives not only build awareness but also prepare graduates to integrate sustainability principles into their future careers.

10.1.2. Training for Academic and Administrative Staff

Faculty and administrative personnel play a crucial role in embedding sustainability into teaching, research, and operations. Universities should offer:

- Professional development workshops on integrating sustainability into curricula.
- Training on energy-efficient office practices and sustainable procurement.
- Seminars on green research funding opportunities and interdisciplinary collaboration.
- Technical training for facility managers and maintenance staff on energy systems, water management, and waste reduction technologies.

Providing tailored training ensures that sustainability is not treated as an isolated responsibility but becomes an institutional-wide commitment.

10.1.3. Building Institutional Capacity

Beyond individual training, universities should develop institutional mechanisms such as:

- Sustainability offices or dedicated coordinators.
- Cross-departmental sustainability committees.
- Regular knowledge-sharing sessions and internal best-practice exchanges.

In Bosnia and Herzegovina and Montenegro, where climate-neutral transitions are still developing, structured capacity building strengthens institutional resilience and ensures long-term progress.

10.2. Stakeholder Engagement

Sustainability initiatives are most effective when they are inclusive and participatory. Engaging diverse stakeholders ensures that sustainability policies reflect real needs, generate broad support, and achieve measurable impact.

10.2.1. Inclusive Planning and Decision-Making

Universities should involve students, faculty, staff, alumni, and local community representatives in the development and monitoring of sustainability strategies. This can be achieved through:

- Public consultations and feedback mechanisms.
- Sustainability forums and roundtable discussions.
- Participatory workshops for strategic planning.
- Representation of diverse groups in sustainability councils.

Inclusive governance fosters transparency and accountability while strengthening institutional ownership of sustainability goals.

10.2.2. Alumni and Community Involvement

Alumni networks can contribute expertise, mentorship, and financial support for green initiatives. Engaging alumni working in environmental sectors strengthens collaboration between academia and industry.

Similarly, partnerships with local communities enhance the societal relevance of university initiatives. Universities can collaborate with schools, municipalities, NGOs, and businesses to co-create sustainability campaigns, climate adaptation projects, or environmental education programs.

Stakeholder engagement transforms sustainability from an internal campus initiative into a broader societal mission.

10.3. Student and Staff Engagement

Daily behavior significantly influences a university's environmental footprint. Encouraging sustainable habits among students and staff is therefore crucial.

10.3.1. Awareness Campaigns

Universities can organize communication campaigns to promote:

- Energy-saving practices (turning off lights and equipment).
- Waste segregation and recycling.
- Reduced use of single-use plastics.
- Water conservation.
- Sustainable transportation options.

Clear signage, digital communication platforms, and visible reminders across campus can reinforce environmentally responsible behavior.

10.3.2. Incentive Programs

Incentives can motivate engagement, such as:

- Competitions between faculties for reducing energy consumption.
- Recognition awards for green initiatives.
- Discounts or benefits for sustainable commuting choices.

These initiatives foster a sense of shared responsibility and healthy competition.

10.3.3. Empowering Grassroots Initiatives

Supporting student-led and staff-led sustainability projects encourages innovation and creativity. Micro-grants or small funding schemes can enable grassroots initiatives such as urban gardening, recycling art projects, or environmental awareness campaigns.

Active engagement strengthens institutional culture and ensures that sustainability principles are embedded in everyday campus life.

10.4. Green Certifications and Recognition

Pursuing recognized sustainability certifications enhances institutional credibility and demonstrates commitment to environmental excellence.

One example is the **Green Campus** certification under the Green Campus Project, which supports universities in implementing structured sustainability measures and achieving formal recognition for their efforts.

Benefits of Green Certifications

- External validation of sustainability achievements.
- Benchmarking against international standards.
- Increased visibility and reputation.
- Enhanced attractiveness for students, partners, and funding agencies.
- Structured frameworks for continuous improvement.

Participation in certification programs encourages systematic monitoring, documentation, and reporting of sustainability performance.

Continuous Improvement Through Recognition

Recognition programs should not be viewed as one-time achievements but as tools for continuous development. Regular assessments, audits, and improvement plans ensure sustained progress toward climate neutrality.

For universities in Bosnia and Herzegovina and Montenegro, obtaining green certifications strengthens international competitiveness and aligns institutions with European sustainability standards.

10.5. Sustainability Events

Events provide visible, engaging platforms to promote environmental awareness and strengthen community involvement.

Types of Sustainability Events

- Sustainability fairs, showcasing green technologies, student projects, and local eco-businesses.
- Eco-awareness campaigns, focusing on specific themes such as zero waste, biodiversity, or renewable energy.
- Tree-planting initiatives and biodiversity restoration projects on campus or in local communities.
- Earth Day celebrations and climate action weeks, integrating workshops, lectures, and volunteer activities.
- Public lectures and panel discussions with sustainability experts and policymakers.

Such events create momentum, inspire participation, and reinforce institutional commitment. Sustainability events can be linked to coursework, research presentations, or service-learning projects. Integrating events with academic activities enhances learning outcomes and ensures broader participation.

Environmental awareness and engagement are central to achieving climate-neutral universities. Through structured training and capacity building, inclusive stakeholder engagement, behavior-focused campaigns, pursuit of green certifications, and dynamic sustainability events, higher education institutions in Bosnia and Herzegovina and Montenegro can foster a strong culture of environmental responsibility.

Sustainability is not only a technical or administrative goal—it is a collective endeavor that depends on informed, motivated, and empowered individuals. By embedding awareness and engagement across institutional structures and daily practices, universities can accelerate their climate transition while inspiring broader societal change throughout the Western Balkans.

11. Compliance with National and EU Regulations

Compliance with national and European Union (EU) environmental regulations is a fundamental pillar of climate-neutral universities in Bosnia and Herzegovina (BiH) and Montenegro. Higher education institutions are not only centers of education and research but also public institutions that must operate within established legal frameworks. Aligning institutional strategies with national legislation and EU green transition policies ensures regulatory compliance, enhances institutional credibility, and supports broader climate commitments.

As both BiH and Montenegro move toward strengthened environmental governance and EU integration pathways, universities must proactively adapt their policies, operations, and reporting systems to reflect evolving climate and sustainability standards.

11.1. Following National Regulations

Bosnia and Herzegovina and Montenegro are signatories to the Paris Agreement, committing to global efforts to limit temperature rise and reduce greenhouse gas emissions. These commitments require national governments to implement policies related to energy transition, emissions reductions, environmental protection, and sustainable development.

HEIs must ensure that their operational practices align with:

- National climate strategies and action plans
- Environmental protection laws
- Waste management regulations
- Energy efficiency standards
- Air and water protection policies

As public institutions, universities are expected to serve as role models in implementing sustainable practices that reflect national climate objectives.

National legislation in both BiH and Montenegro regulates waste disposal, recycling, hazardous material handling, and environmental impact assessments. Universities must:

- Implement proper waste segregation and disposal systems
- Ensure safe management of laboratory chemicals and hazardous waste
- Comply with local municipal waste regulations
- Monitor emissions and resource consumption where required

Failure to comply with national environmental standards may result in legal consequences, reputational damage, and loss of public trust.

Universities often operate large campuses with significant energy consumption. National regulations increasingly require public buildings to improve energy efficiency and reduce emissions. HEIs should therefore:

- Conduct regular energy audits
- Upgrade buildings in accordance with national efficiency standards
- Invest in renewable energy installations
- Monitor and report energy consumption

By aligning campus infrastructure with national energy regulations, universities not only comply with legal requirements but also reduce operational costs and environmental impact.

Compliance requires structured internal governance. Universities should establish:

- Sustainability officers or compliance units
- Monitoring and reporting systems
- Clear environmental policies and procedures
- Internal audits to assess regulatory adherence

Proactive compliance reduces risk and positions universities as responsible public institutions supporting national sustainability transitions.

11.2. EU Green Transition Policies

The European Commission has launched the European Green Deal as a roadmap to make Europe climate-neutral by 2050. Although BiH and Montenegro are not yet EU Member States, alignment with EU environmental directives is essential within the EU accession framework.

Universities must anticipate and gradually adopt standards related to:

- Carbon emissions reduction
- Renewable energy integration
- Circular economy principles
- Sustainable mobility
- Biodiversity protection

Early alignment strengthens institutional readiness for future EU membership obligations.

EU directives cover a wide range of environmental areas, including waste management, water quality, air pollution, and energy performance of buildings. HEIs preparing for EU integration should:

- Align waste management systems with EU Waste Framework Directive principles
- Ensure campus buildings meet EU energy performance standards
- Implement sustainable public procurement practices
- Establish systems for environmental risk management

Gradual harmonization with EU directives reduces future compliance burdens and enhances eligibility for European funding programs.

An important framework for sustainable finance and reporting is the EU Taxonomy for Sustainable Activities. The EU Taxonomy defines criteria for environmentally sustainable economic activities and establishes reporting requirements for organizations seeking green investment and funding.

For HEIs, adopting principles from the EU Taxonomy can support:

- Transparent sustainability reporting
- Classification of environmentally sustainable projects
- Access to EU grants and green funding instruments
- Alignment with international environmental standards

Although not yet mandatory for all institutions in BiH and Montenegro, early adoption enhances institutional credibility and prepares universities for future regulatory developments.

Compliance with EU green policies increases eligibility for funding programs such as Horizon Europe and Erasmus+. Many EU-funded projects require demonstrated commitment to sustainability, environmental management, and climate neutrality goals.

By aligning with EU green transition frameworks, universities can:

- Strengthen cross-border collaboration
- Increase competitiveness in research funding
- Enhance institutional visibility
- Contribute to regional integration

Regulatory alignment is therefore not merely a legal obligation but also a strategic opportunity.

11.3. Integrating Compliance into University Strategy

Compliance should not be viewed as a reactive or administrative burden. Instead, it should be integrated into institutional strategy and long-term planning.

11.3.1. Strategic Integration

Universities should embed regulatory compliance into:

- Institutional development plans
- Sustainability strategies
- Risk management frameworks
- Procurement policies
- Infrastructure planning

Strategic integration ensures coherence between legal obligations and institutional objectives.

11.3.2. Monitoring and Reporting Mechanisms

Effective compliance requires transparent monitoring systems. Universities can establish:

- Environmental performance indicators
- Annual sustainability reports
- Internal compliance audits
- Digital tracking systems for energy, water, and waste

Regular reporting enhances accountability and facilitates continuous improvement.

11.3.3. Capacity Building for Compliance

Administrative and technical staff must be trained to understand evolving national and EU regulations. Workshops and legal briefings can strengthen institutional readiness and ensure that sustainability teams remain informed about regulatory changes.

Compliance with national and EU regulations is a cornerstone of climate-neutral universities in Bosnia and Herzegovina and Montenegro. By adhering to national environmental laws and aligning with obligations under the Paris Agreement, HEIs demonstrate responsibility and leadership in addressing climate change. Simultaneously, gradual harmonization with EU green transition policies—including frameworks such as the EU Taxonomy—positions universities for future integration, funding opportunities, and international collaboration.

Rather than viewing compliance as a minimum requirement, universities should treat it as a strategic driver of institutional transformation. Through structured governance, proactive adaptation, and transparent reporting, HEIs can strengthen their role as pioneers of sustainable development in the Western Balkans while contributing meaningfully to both national and European climate objectives.

12. Financial Investments and Green Funding

The transition toward climate-neutral universities requires not only strategic planning and institutional commitment but also adequate financial resources. Sustainable infrastructure upgrades, renewable energy installations, research initiatives, and awareness programs all require targeted investments. For higher education institutions in Bosnia and Herzegovina and Montenegro, securing sustainable financing and developing innovative funding mechanisms are essential to ensure long-term success.

Financial investments in sustainability should be viewed not merely as costs, but as strategic investments that generate environmental, social, and economic returns. Energy efficiency measures reduce operational expenses, renewable energy installations lower long-term energy costs, and green campuses enhance institutional reputation and attractiveness to students, partners, and donors.

12.1. Sustainable Financing

Universities should begin by integrating sustainability priorities into their regular budgeting processes. Rather than treating green initiatives as optional or temporary projects, climate-neutral objectives should be embedded into institutional financial planning.

Key measures include:

- Allocating dedicated annual budgets for sustainability projects
- Establishing a "Green Fund" within the university for energy efficiency and environmental innovation
- Integrating sustainability criteria into procurement and infrastructure investment decisions
- Prioritizing lifecycle cost analysis over short-term cost savings

For example, although energy-efficient lighting systems or building insulation may require higher upfront investment, they produce long-term savings through reduced energy consumption. Adopting lifecycle financial planning ensures that environmental and economic benefits are aligned.

Universities can implement revolving green funds, where savings generated from energy efficiency measures are reinvested into additional sustainability projects. This creates a self-sustaining financial mechanism that accelerates climate-neutral transformation without requiring continuous increases in core budgets.

Energy audits, performance monitoring, and transparent reporting are critical to identifying savings and ensuring that reinvestment strategies are effective.

External funding plays a crucial role in enabling large-scale sustainability initiatives. Universities in Bosnia and Herzegovina and Montenegro can seek financial support from EU programs such as:

- Horizon Europe (research and innovation funding)
- Erasmus+ (education and capacity-building projects)
- Instrument for Pre-accession Assistance (IPA) funds
- Western Balkans Investment Framework (WBIF)

Alignment with the priorities of the European Commission and the objectives of the European Green Deal increases eligibility for such funding opportunities.

To successfully access these funds, HEIs should:

- Develop dedicated grant-writing teams

- Strengthen project management capacity
- Establish international research partnerships
- Align institutional strategies with EU sustainability frameworks

Proactive engagement in EU funding programs not only provides financial support but also strengthens institutional networks and visibility at the European level.

Beyond EU programs, international organizations and development agencies often provide grants or technical assistance for climate action, renewable energy, and environmental education. Universities can collaborate with multilateral institutions, foundations, and climate-focused funds to secure additional resources.

Successful fundraising requires:

- Clear sustainability strategies
- Transparent governance structures
- Demonstrated impact and measurable indicators
- Strong monitoring and evaluation systems

A well-developed sustainability roadmap enhances credibility and increases the likelihood of attracting external funding.

12.2. Public-Private Partnerships

Public-private partnerships (PPPs) provide opportunities for universities to collaborate with companies specializing in green technologies, renewable energy, sustainable construction, waste management, and environmental consulting.

Through PPPs, universities can:

- Install renewable energy systems (e.g., solar panels) through shared investment models
- Develop smart campus technologies for energy management
- Pilot innovative green solutions
- Gain access to technical expertise and cutting-edge technologies

Private sector partners benefit from testing solutions in real-world campus environments, while universities gain access to technology, investment, and practical experience.

Collaboration with private companies can strengthen applied research in green technologies. Joint research projects may focus on:

- Renewable energy systems
- Energy storage technologies
- Sustainable building materials
- Circular economy innovations
- Climate adaptation technologies

Such partnerships can generate co-funded research grants, internships for students, and commercialization opportunities for university-developed technologies.

Public-private partnerships can also reduce financial risks associated with large infrastructure investments. For example, energy performance contracting allows private companies to finance and implement energy efficiency improvements, with repayment based on achieved energy savings.

This model enables universities to modernize infrastructure without significant upfront capital expenditure while ensuring performance accountability.

While PPPs offer significant benefits, universities must ensure that partnerships align with institutional values and sustainability goals. Transparent procurement processes, clear contractual agreements, and environmental performance standards are essential to maintain public trust and institutional integrity.

Partnerships should prioritize long-term sustainability outcomes rather than short-term financial gains.

Financial investments and green funding mechanisms are critical enablers of climate-neutral universities in Bosnia and Herzegovina and Montenegro. By integrating sustainability into internal budgeting processes, establishing revolving green funds, and accessing EU and international funding programs, universities can mobilize the financial resources necessary for transformative change.

At the same time, public-private partnerships offer innovative pathways for shared investment, technological advancement, and applied research in green technologies. When structured transparently and strategically, these partnerships accelerate infrastructure modernization and enhance institutional resilience.

Ultimately, sustainable financing is not simply about securing funds—it is about embedding long-term environmental responsibility into financial decision-making. By aligning economic planning with sustainability objectives, universities can ensure that climate neutrality becomes both financially viable and institutionally sustainable.

13. Monitoring and Reporting

Monitoring and reporting are essential components of a climate-neutral university strategy. Without measurable targets, reliable data, and transparent reporting systems, sustainability commitments risk remaining aspirational rather than actionable. For higher education institutions in Bosnia and Herzegovina and Montenegro, establishing robust monitoring frameworks ensures accountability, regulatory compliance, and continuous improvement.

Effective monitoring allows universities to track progress toward climate neutrality, identify gaps, prioritize investments, and communicate achievements to stakeholders. Transparent reporting strengthens institutional credibility, enhances access to funding, and positions universities as responsible leaders in the regional green transition.

13.1. Set Clear Targets and Timeline

The foundation of effective monitoring lies in setting clear, measurable, and time-bound goals. Universities should define specific targets related to:

- Greenhouse gas (GHG) emissions reduction
- Energy efficiency improvements
- Renewable energy adoption
- Waste reduction and recycling rates
- Water conservation
- Sustainable mobility uptake

Targets should be aligned with national climate strategies and international commitments, while also reflecting institutional capacities and resources.

Many universities globally have committed to achieving net-zero emissions by 2030 or 2050. HEIs in Bosnia and Herzegovina and Montenegro may adopt similar long-term ambitions, accompanied by intermediate milestones (e.g., 30% emissions reduction by 2030, 60% by 2040).

Establishing phased targets ensures that progress is incremental and manageable. Clear timelines allow institutions to plan infrastructure upgrades, secure funding, and mobilize stakeholders in a coordinated manner.

Climate targets should be embedded into institutional strategic plans, campus development strategies, and annual operational plans. Assigning clear responsibilities

to departments or sustainability offices enhances accountability and ensures progress is systematically reviewed.

Well-defined targets transform sustainability from a general aspiration into a structured institutional commitment.

13.2. Carbon Footprint Assessment

A Baseline Carbon Emissions Inventory is a critical first step toward climate neutrality. Universities must measure their current carbon footprint to understand the scale and sources of emissions.

The inventory should include:

- **Scope 1 (Direct Emissions):** Emissions from on-campus fuel combustion, university-owned vehicles, and heating systems.
- **Scope 2 (Indirect Energy Emissions):** Emissions from purchased electricity, heating, or cooling.
- **Scope 3 (Other Indirect Emissions):** Emissions from business travel, student commuting, procurement, supply chains, food services, and waste disposal.

Identifying these categories enables universities to prioritize high-impact areas for emissions reduction. Accurate carbon assessment requires reliable data collection systems, including:

- Utility bills and energy consumption records
- Transportation surveys
- Procurement and supply chain data
- Waste generation statistics

Universities may establish digital tracking systems to centralize environmental data and facilitate analysis. Collaboration between finance departments, facilities management, and sustainability offices is essential for accurate reporting.

Carbon footprint assessments should not be one-time exercises. Regular updates (annually or biannually) allow institutions to track trends, evaluate policy effectiveness, and adjust strategies accordingly.

By establishing a robust baseline and monitoring progress over time, universities can move from estimation to evidence-based decision-making.

13.3. Use Standardized Protocols

To ensure credibility and comparability, universities should follow internationally recognized standards such as the Greenhouse Gas Protocol. The Greenhouse Gas Protocol provides comprehensive guidelines for measuring and managing greenhouse gas emissions.

Using standardized protocols offers several advantages:

- Consistency in data reporting
- International comparability
- Increased transparency
- Enhanced credibility with donors and partners
- Alignment with national and EU reporting expectations

Adherence to established frameworks strengthens institutional integrity and ensures methodological rigor.

As Bosnia and Herzegovina and Montenegro advance toward EU integration, alignment with European sustainability reporting frameworks becomes increasingly important. Standardized methodologies facilitate compatibility with EU climate policies and funding requirements.

Universities that adopt recognized protocols position themselves as proactive institutions prepared for future regulatory developments.

13.4. Sustainability Reporting

Regular sustainability reporting is a key mechanism for tracking performance and ensuring accountability. Universities should develop structured reporting systems covering:

- Energy consumption and efficiency
- Renewable energy production
- Waste generation and recycling rates
- Water usage
- Carbon emissions
- Sustainable mobility indicators
- Procurement sustainability metrics

Reports may be published annually and integrated into institutional performance reviews.

Transparent reporting builds trust among students, staff, public authorities, funding bodies, and community partners. Public sustainability reports demonstrate institutional commitment and allow stakeholders to evaluate progress.

Digital dashboards, sustainability webpages, and open-access reports enhance accessibility and engagement.

Monitoring data should inform strategic decisions. For example:

- Rising energy consumption may signal the need for infrastructure upgrades.
- Low recycling rates may require enhanced awareness campaigns.
- High commuting emissions may justify investment in sustainable mobility initiatives.

Reporting is not merely descriptive—it is a strategic tool for continuous improvement.

13.5. Green Certifications and Ranking

External validation can strengthen monitoring systems and motivate progress. Universities may seek recognition through sustainability ranking and certification programs such as:

- Association for the Advancement of Sustainability in Higher Education STARS (Sustainability Tracking, Assessment & Rating System)
- UI GreenMetric World University Rankings

These frameworks provide structured indicators across areas such as energy, waste, water, transportation, education, and research.

Benefits of Certifications and Rankings

- Benchmarking against peer institutions
- Identifying performance gaps
- Strengthening institutional reputation
- Enhancing attractiveness to students and partners
- Encouraging internal accountability

Participation in ranking systems encourages systematic data collection and fosters a culture of evidence-based sustainability management.

Certifications and rankings should be viewed as tools for improvement rather than solely as reputation-building mechanisms. Periodic reassessment encourages universities to refine strategies, set higher targets, and innovate continuously.

Monitoring and reporting are indispensable pillars of climate-neutral university strategies in Bosnia and Herzegovina and Montenegro. By setting clear targets and timelines, conducting comprehensive carbon footprint assessments, applying standardized protocols such as the Greenhouse Gas Protocol, and establishing transparent reporting systems, HEIs can ensure accountability and measurable progress.

External certifications and sustainability rankings further strengthen credibility and provide structured pathways for improvement. Ultimately, effective monitoring transforms sustainability commitments into tangible outcomes. Through systematic measurement, transparent reporting, and continuous evaluation, universities can lead by example—demonstrating that climate neutrality is not only an ambition, but an achievable and measurable objective.

14. Conclusion

The transition toward climate-neutral universities in the Western Balkans is both an urgent necessity and a transformative opportunity. As institutions that educate future leaders, generate knowledge, and influence societal development, universities in Bosnia and Herzegovina, Montenegro, and the wider region carry a profound responsibility to lead by example. Climate neutrality is not a single initiative or short-term project—it is a long-term institutional commitment that requires strategic vision, operational reform, cultural change, and sustained investment.

This Manual has outlined a comprehensive framework for action. From leadership commitment and strategic integration of sustainability into institutional missions, to energy efficiency, renewable energy adoption, green campus infrastructure, waste management, and sustainable mobility, each chapter contributes to a holistic pathway toward reducing environmental impact. Equally important are curriculum and research integration, collaboration and partnerships, environmental awareness, compliance with national and EU regulations, sustainable financing, and transparent monitoring and reporting. Together, these components form an interconnected system that enables universities to move from ambition to measurable results.

Achieving climate neutrality requires clear targets, reliable data, and accountability. It demands inclusive stakeholder engagement, interdisciplinary cooperation, and alignment with national and European sustainability frameworks. It also requires financial innovation, leveraging both internal resources and external green funding opportunities. When supported by strong governance structures and continuous monitoring, these efforts create a resilient foundation for long-term progress.

Importantly, the journey toward climate neutrality is not solely about reducing carbon emissions. It is about redefining the role of universities as catalysts for sustainable development, social equity, and green innovation. It is about preparing students with the competencies needed for emerging green economies and empowering research communities to develop solutions to pressing environmental challenges. It is about strengthening regional cooperation in the Western Balkans and aligning higher education institutions with European and global sustainability objectives.

The path forward will require dedication, collaboration, and persistence. However, by adopting the strategies and tools outlined in this Manual, universities can transform their campuses into living laboratories of sustainability and become visible leaders of the green transition in the region. Through collective commitment and strategic action, climate-neutral universities in the Western Balkans can help build a more resilient, inclusive, and sustainable future for generations to come.