FROM THE NATIONAL REPORTS ON HEIs ENERGY RESOURCE MANAGEMENT POLICIES TOWARDS A ROADMAP FOR ACTION

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Vilnius Gediminas Technical University (VILNIUS TECH)

Advanced tools for Behavioural Change in energy consumption for Higher Education Stakeholders (ABCinEnergy)

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INTRODUCTION

The aim and methodological approach for a roadmap development.

The main framework for the roadmap development is an overview of strategies and policies, and actions representing the expertise and institutional practices in the area of sustainability and energy of the ABCinENERGY project partners. This overview aims to showcase the interplay between national contexts and the institutional initiatives of project partners, and highlight actions, measures, and instruments that Higher Education Institutions (HEIs) can apply to implement sustainability goals, with a particular focus on energy resources, taking into account the given national context.

This report provides insights into institutional settings and energy-saving practices at HEIs in Austria (University of Graz), France (University of Montpellier), Italy (University of Palermo), Lithuania (Vilnius Gediminas Technical University – VILNIUS TECH), Serbia (University of Novi Sad), and Spain (University of Alicante).

The national reports (see Annexes 1–6) provide the foundation for identifying patterns in energy-saving behaviours and institutional practices. They serve as the starting point for developing a common strategic approach across HEIs. Building on these insights, the methodology below outlines the sequential steps undertaken to create a unified, evidence-based roadmap for integrating sustainability and energy-related KPIs into HEIs, in alignment with national energy and climate objectives. The process consists of **four main steps**:

1. NATIONAL AND INSTITUTIONAL POLICY CONTEXTS
2. IDENTIFY BEST PRACTICES AND CHALLENGES
3. ASSESS EXISTING ENERGY KPIS AND DATA
4. DEVELOP THE CONSORTIUM ROADMAP

The first three steps were supported by data collection unified templates developed specifically for this purpose:

i. Template for national reports on sustainability and energy strategies, in particular, which are influencing energy resource management policies at HEIs.
ii. Template for identifying best practices and challenges in sustainable usage of energy resources monitoring and sustainability.
iii. Template for identifying existing data on energy KPIs.

The methodology and structure of the reports. The national reports were collected during October 2024 and May 2025. The data collecting methods included legal document analysis, primary and secondary data review, surveys, expert evaluation, and in-depth interviews or focus groups when necessary. Partners were free to choose the most suitable data collection methods to meet the survey's goals. In-text references and hyperlinks for analysed documents, as well as a reference list at the end of each report, were required to ensure the validity of findings and to allow access to primary sources if necessary.

Step 1. NATIONAL AND INSTITUTIONAL POLICY CONTEXTS

The template (i.) for national reports on sustainability and energy strategies, in particular, which are influencing energy resource management policies at HEIs, included both open questions and a structured multiple-choice question section. The structure of the report enables the analysis, cascading from the macro level (national) context towards institutional levels and concluding with a description of potential synergies between national and institutional practices at partner HEIs. The report template consisted of 3 parts:

- *The interplay of the national and institutional strategies: the findings of the national reports* provide an overview of the national strategies or policies in the fields of energy and sustainability, focusing on their aim, guidelines, timeframe, action measures, and potential impact on the public sector and HE in particular.
- *Current HEI Strategies and Policies overview* provides key university data (e.g., student and staff population, campus size, infrastructure conditions) and outlines each university's sustainability vision (e.g., transforming to a carbon-neutral campus, green campus, any other long-term projection). Each national report includes an overview of strategies, policies and regulatory documents currently used by the university (solely focused on energy resources or integrating this topic into a broader context), which are guiding the behaviour of the students and staff and can be used for enhancing their energy usage awareness and changing their behaviour.
  A special emphasis was given to investigating the engagement of the university community (students and staff) in energy resource-saving action at HEIs. The main aim of this part is to identify how the responsibilities for implementation are shared, who are the main actors responsible for setting strategies and guidelines, monitoring, evaluation, reporting and communication, and how the participation and engagement level of the academic community are ensured. The data for this particular part of the report was collected in a structured way, using a 5-point Likert scale assessment of the role of different target groups. This part was named „**Institutional involvement for action"**.
- *Interconnections of Strategies and Policies: Hierarchies*, addressed the relationship between national and HEI-level strategies and explained how national strategies are translated into actionable initiatives at the HEI level, and how institutional policies align with or differ from national ones. It also evaluates the level of institutional autonomy and flexibility in setting energy-related goals and KPIs, and assesses institutional readiness to take leadership beyond compulsory legal frameworks. Additionally, this section identifies university-specific, innovative practices. The best practices were gathered for a case analysis to identify possible institution-specific actions characterised by high engagement and motivation of participants.

Due to limitations on report length, the first and the last parts have been combined. This approach allows the interplay between national and institutional strategies, and their practical implementation at HEIs, to be analysed coherently, while maintaining a logical flow from macro-level policy to institutional-level actions and initiatives.

Step 2. IDENTIFY BEST PRACTICES AND CHALLENGES

The template (2) for identifying best practices and challenges in sustainable usage of energy resources monitoring and sustainability was aimed at identifying the experience-based solutions in responsible energy resources management implemented at HEIs. The cases (Annex 7) were supposed to be further used in a two-fold way: as the base to understand the variety of potential activities supporting institutional strategies, and as a blueprint for partner universities developing their institutional activities. Learning, behavioural change and engagement campaigns were under the spotlight of this survey. In order to enhance the transferability of the practices, all cases provide the context (needs, demand, situation), the aim of the action, the main players, their roles and the results achieved. The factors contributing to the success (with special focus on motivation instruments) and key conditions to make it transferable are explained.

The main criteria for selecting the 2-3 cases per partner were their potential to be transferred to other universities and create a sustainable impact, solution or action. In total, 10 cases were provided with a detailed description of their implementation. The insights on overcoming possible barriers (structural, financial, technological, or policy-related, socio-cultural, individual habit-related) were collected for the next stages of the ABCinENERGY project.

Step 3. ASSESS EXISTING ENERGY KPIs AND DATA

The national reports were complemented by *the template (3) for identifying existing data on energy KPIs,* aimed at identifying existing data on energy key performance indicators (KPIs), which are used for the monitoring and assessment of energy–use results at partner HEIs. This involved collecting KPIs the institutions are already tracking (energy consumption, generation, efficiency, renewable energy and similar), the KPI metrics (relative and total), and also allowed assessing the availability of current data sources and consequently identifying gaps: missing or unmonitored indicators. These survey results were further used to create a foundation for a roadmap.

To summarise, the composition of the 3 interrelated surveys per partner (National reports, Identifications of good practices (Case analysis) and KPIs survey and their aggregated results became the main premise for building a valid foundation for ABCinENERGY Roadmap development.

Step 4. DEVELOP THE CONSORTIUM ROADMAP

Based on the results of the previous three stages, the consortium's action plan will be developed by summarising and comparing national and institutional strategies, identifying best practices and current challenges, and evaluating existing and potentially identifiable KPI data. The guidelines will define phased implementation actions, responsibilities, and monitoring mechanisms to help higher education institutions integrate sustainability and energy efficiency practices across the consortium.

1. NATIONAL AND INSTITUTIONAL POLICY CONTEXTS

1.1 THE INTERPLAY OF THE NATIONAL AND INSTITUTIONAL STRATEGIES. INTERCONNECTIONS OF STRATEGIES AND POLICIES: HIERARCHIES.

Analysis of six national reports—each providing an overview of the national impact (strategies, policies, imperatives) on HEIs through the lens of the ABCinENERGY partners as follows: University of Graz (Uni Graz) – Austria, University of Montpellier (UM) – France, University of Palermo (UNIPA) – Italy, Vilnius Gediminas Technical University (VILNIUS TECH) – Lithuania, University of Novi Sad (UNS) – Serbia, University of Alicante (UA) – Spain. The national policy context paired with a representative university case allowed identification of (1) how institutional (HEI-level) energy and sustainability policy development correlates with national policy development, and (2) which models of interplay between national policy and university strategy emerge across the institutional practices provided.

The roadmap development task required identifying the Common European context in terms of energetic sustainability affecting all the partner universities and, therefore, setting the framework for unified strategic directions. In addition to that, the level of legally binding requirements was in the focus of analysis in order to understand how strong the national imperatives are and how many legally binding commitments in the energy-saving domain should be transferred into institutional strategies and decision-making. The main question explored was what is the scope of these imperatives in the energy resource use domain, if any.

The premise for the common blueprint for action is the fact that all six countries (Austria, France, Italy, Lithuania, Serbia, and Spain) follow the European Green Deal and the 2030 Agenda, seeking carbon neutrality by 2050. The main themes and, therefore, strategic directions at the European and national levels include energy efficiency, renewable energy, climate resilience, and emphasise the importance of stakeholder engagement across the entire spectrum of national strategies. HEIs are consistently recognised as drivers of education, research, innovation, and public awareness in these transitions, raising expectations to see universities as the orchestrators of knowledge circulation in their ecosystems and leading players who can initiate and provide solutions to accelerate the Green Transition. Despite the general agreement on the pan-European goals for 2030, the peculiarities of the national composition of strengths and challenges, the structure of energy resources, patterns of use, and the profile of the industry dictate specific challenges reflected in national policies and transferred by different instruments into the HEIs' domain. Considering national Sustainability and Energy Policy-related obligations for HEIs, we can see three potential alternatives: strong alignment with national policies through regulatory measures; commitment regulated by partial measures; voluntary commitment in a “no regulatory pressure” environment (Table 1).

Table 1. Alternative national context scenarios for the regulation of the energy-related institutional commitment.

Country	Legally Binding for HEIs?	Nature of Binding Obligation	Enforcement / Penalties
Austria	Yes	University performance agreements with 2035 neutrality and 2030 interim targets	Budget reductions or corrective measures if HEIs fail performance agreement terms
France	Yes	Tertiary Education decree mandates −40% energy use by 2030; “Plan Vert” legally required for HEIs	Administrative fines for non-compliance (up to €7,500/building)
Spain	Partially	HEIs follow general public-sector energy laws (e.g., energy audits, 10% cut, large institutions have special obligations)	General administrative fines, typically not enforced at HEI level
Italy	No	HEIs are encouraged via PNRR and strategy documents but not compelled by law	None specified
Lithuania	No	Voluntary climate- neutrality commitment (joint declaration by Lithuanian universities Rectors Conference)	No legal enforcement; peer and funder accountability only
Serbia	No	National Law on Climate Change does not mandate HEI compliance	No penalties specific to HEIs

The context analysis provided by partners illustrates the framework for national commitment. **Austria’s** national climate targets (climate-neutral by 2040, interim 2030 targets) are explicitly extended to universities and are foreseen through a Climate Neutrality Mandate (2040). The Federal University Development Plan (GUEP) requires all public universities to achieve climate-neutral campuses by 2035. Performance agreements (Leistungsvereinbarungen, §13 Universities Act 2002) require each public university to sign a triennial performance agreement that incorporates sustainability goals (e.g., mandatory greenhouse gas

inventories, energy audits, and climate roadmaps), with indicators planned for reductions in emissions and energy use. These are legally binding public-law contracts defining strategic obligations. Each of the 22 public universities concludes these performance agreements with the Federal Ministry of Education, Science and Research (BMBWF). Typical obligations for universities include preparing annual GHG balances, publishing a campus climate-neutrality roadmap, and integrating sustainability topics not only into operations but also into curricula, in line with the GUEP directive. The performance agreements include enforcement measures: if agreed-upon targets are missed, the contracts allow the Ministry to require corrective measures or to impose funding cuts.

Plan Vert in **France** requires every higher education institution to adopt a Green Campus Plan, covering the environmental dimensions of campus policy since 2009. Universities must implement sustainable development programs (governance, campus management, curricula) and can pursue DD&RS (sustainability) labels. Energy-saving decree rules apply directly to universities: it mandates that all tertiary-sector buildings (including universities) reduce final energy consumption by ≥ 40% by 2030 (relative to 2010), 50% by 2040, and 60% by 2050. The decree sets out reporting obligations on energy use (via the OPERAT platform) and requires each campus to develop an action plan. Under the above-mentioned decree, prefectural authorities oversee compliance. Persistent non-compliance can incur administrative fines. The Grenelle requirement has no specific penalties, but universities risk reputational damage and loss of eligibility for green funding if they ignore the Plan Vert mandate.

Although there are no special HEI mandates according to **Spain**'s national climate and energy laws (e.g., Law 7/2021 on Climate Change, National Energy and Climate Plan), which set overall decarbonization goals but do not impose HEI-specific obligations, universities are treated like other public bodies and must comply with general public-sector energy regulations. Large public entities (including most universities) are subject to energy audit requirements under Royal Decree 56/2016 (transposing the EU Energy Efficiency Directive). They also fall under the 2021 Real Decreto 1422/2021 (building energy certificates) and benefit from recovery-plan funding for campus energy upgrades. The government's 2022/2023 energy-saving measures (e.g., RDL 14/2022, which cuts public AC use and imposes heating/cooling limits) have applied to university campuses as part of the state sector. Non-compliance by a university would be handled via ordinary administrative mechanisms. For instance, failure to carry out mandatory energy audits or to follow the government's 10% savings plan could trigger scrutiny by local/regional authorities. By analogy with France, Spanish regulations allow up to €7,500 annual fines for non-reporting of energy plans. However, in practice, enforcement actions are extremely rare.

Italy has ambitious climate and energy targets (carbon neutrality by 2050 in law, EU-aligned NECP targets for 2030), but there are no laws specifically imposing obligations on universities. HEIs fall under broad public-sector mandates and national strategies (e.g., the National Energy and Climate Plan and the new National Transition Plan) for reducing emissions and improving energy efficiency. Italian universities must comply with general regulations: for example, public buildings must meet minimum energy-efficiency standards (nearly-zero-energy building requirements), and public administrations were to reduce consumption by 3% per year, though many of these rules are still being implemented. The Green Public Procurement Decree ensures that public institutions, including universities, prioritise environmentally friendly products and services in their operations. The Sustainable Mobility Law promotes electric vehicles and green transport, encouraging campuses to

transition to sustainable transportation systems and conduct research on urban mobility solutions. It has to be noted that the PNRR (Recovery Plan) and ministerial guidelines encourage universities to plan sustainability, but these are mainly incentives or grants (not obligations). There is no HEI-specific enforcement regime, although failure to perform required energy audits or to renovate to efficiency standards could lead to administrative fines or reduced public funding under general laws. As a proactive move, some universities have voluntarily set their own targets (e.g., via the RUS sustainability network).

Lithuania has no university-specific laws on sustainability that set obligations for universities; however, the Lithuanian Climate Change Management Law (2017) and its 2030 Climate plan set economy-wide targets (e.g., ~30% GHG cut vs. 2005, 45% renewables), which are extended to HEIs as public sector players, without assigning strict duties to HEIs. Public institutions are generally expected to improve efficiency (through the Government Program and EU-derived regulations), which includes universities as state-funded institutions. Lithuanian universities are subject to ordinary energy regulations (building codes, efficiency incentives), but no additional legal instruments target HEIs specifically. Renovation and energy-resource-focused initiatives are stimulated by the National Recovery Plan as incentives, not obligations. There are no distinct enforcement mechanisms for universities. In principle, failure to meet national energy or climate reporting requirements could be sanctioned under public administration law. However, enforcement has focused on industrial emitters; non-compliance by universities (e.g., not submitting energy reports) would likely first prompt administrative warnings only. However, in 2020, all major universities (via the Rectors' Conference – LURK) voluntarily signed a Climate Change Agreement. Under this pact, each university commits to annually report progress (including GHG emissions, energy use, climate-resilience measures) and to update a campus Climate Action Plan every 5 years. This is a jointly declared cooperative commitment, not a statutory obligation.

Serbia's Law on Climate Change (2021) establishes a monitoring, reporting and verification (MRV) system and commits Serbia to reduce GHG emissions by 9.8% by 2030 (vs. 1990). This law covers all sectors, but contains no provisions aimed specifically at universities. There is also a 2050 neutrality goal and a Low-Carbon Development Strategy (2023), aligning with EU targets. As Serbian universities are treated like any public institutions, they must comply with national energy and environmental regulations (e.g., permitting for high-emission facilities, energy-efficiency requirements for public buildings). For instance, under Serbia's Energy Law, large public buildings must improve insulation and may need to appoint energy managers. However, these are general rules, not HEI-specific. The Energy Law (amended in 2021) and the Law on Planning (which integrates climate into planning) impose sustainability requirements on public authorities in general. The Climate Change Law itself sets fines for exceeding permit limits on emissions, but universities typically are not major emitters of regulated GHG (except possibly on-campus boilers). If a university failed to conduct a required energy audit or neglected building codes, it would face the same sanctions as any public entity (e.g., stop-work orders, fines under construction or environmental law). No special penalty mechanism is created for HEIs. The official Low-Carbon Development Strategy calls for all sectors to plan for emission cuts, but in practice, each institution (including universities) must internally decide how to implement these broad goals. It has to be mentioned that universities generally participate voluntarily in state programs and integrate energy-resource-related targets into their strategic development plans (e.g., applying for EE grants).

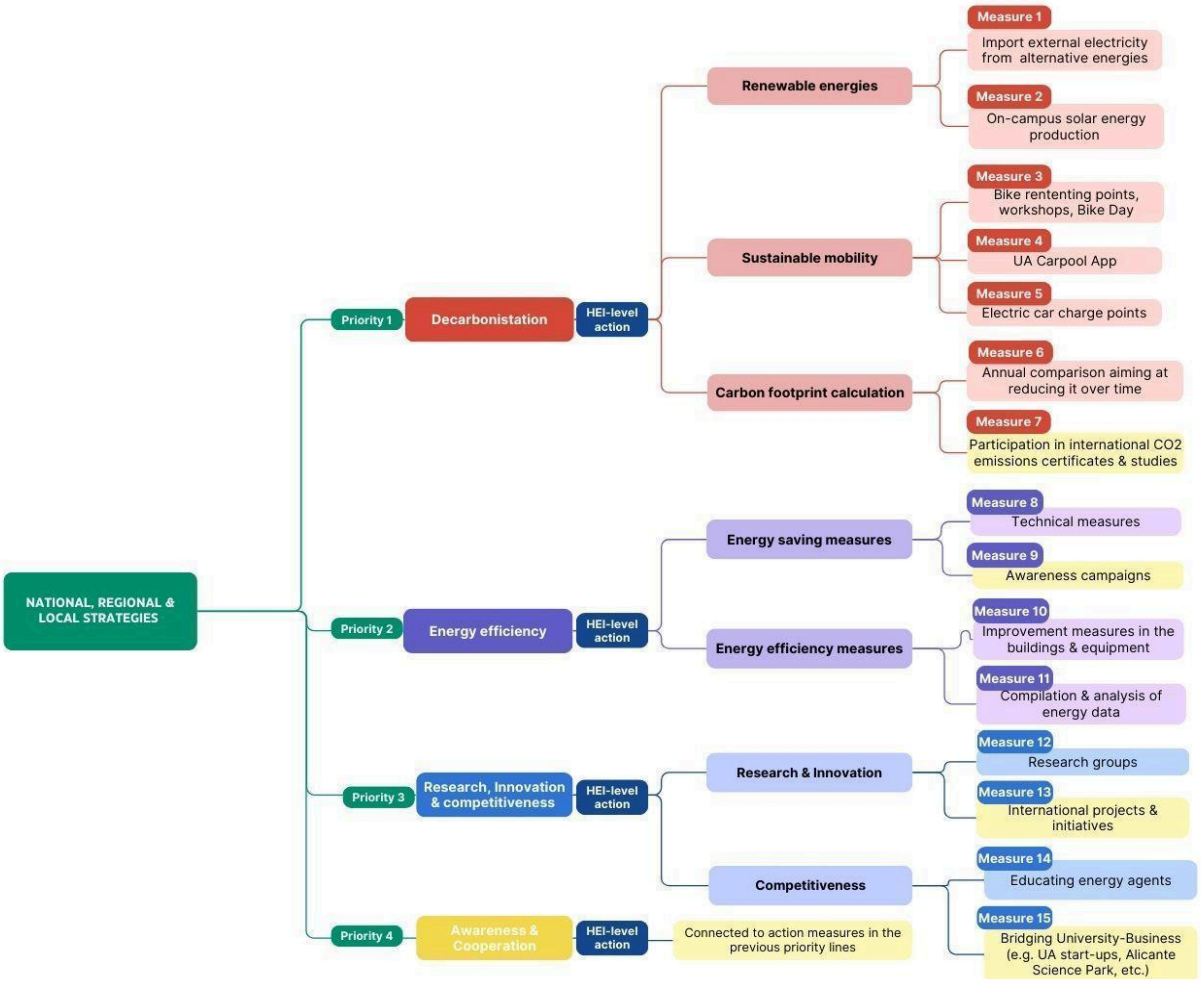

Figure 1. The interplay of the national priorities and institutional response through directions of action and measures (source: University of Alicante (Own elaboration from national report), 2025).

Not only the level of regulatory pressure, but also some aspects and the variety of national policies can be outlined. For example, France emphasises a holistic, centralised, long-term state planning approach (France Nation Verte) for a Green Deal, where universities are involved as public sector bodies. As an example of a medium-term specialised strategy, the Regeneration School Plan in Italy aims to transform universities and schools into “sustainability laboratories” and incorporate environmental education into school and university curricula. Considering the missions assigned to universities, they are expected to be broadly involved in the implementation of national strategies. The case provided by the University of Alicante illustrates the model of complex integration of national strategies into directions for actions and measures at the university level (Figure 1).

These six countries–HEI pairs showcase a spectrum of governance influence — from legally binding performance agreements to voluntary, project-based alignment — and a variety of institutional approaches shaped by funding, national policy scope, and stakeholder structures. This comparative lens reveals that while all universities aim to contribute to national energy and sustainability goals, their strategies diverge in enforcement rigour and

breadth of potential engagement, which reflects a combination of legally binding and voluntary set targets. This demonstrates both institutional solidarity with societal developments and a proactivity and leadership stemming from universities' mission and their role in the ecosystem.

1.2 CURRENT HEI STRATEGIES AND POLICIES OVERVIEW

The six participating universities represent a diverse range of institutional sizes and infrastructure layouts across Europe, offering a comprehensive snapshot of HEIs. The universities vary in size from around 9,000 students (VILNIUS TECH) to approximately 50,000 students (University of Novi Sad). The core group of partners hosts between 26,000 to 35,000 students. These partners reflect the diversity of campus management models, including multicampus structures such as the University of Montpellier, which operates across 10 campuses in various municipalities, and the University of Alicante, with facilities in numerous regional locations; and campuses ranging from modern infrastructure to heritage buildings, as seen at the University of Graz, University of Palermo, and University of Novi Sad.

As mentioned earlier, the sustainability policy in the **University of Graz** is deeply embedded in Austria's national climate commitments, particularly the goal of achieving climate neutrality by 2040. As stated in the national report, this objective is legally binding through institutional performance agreements signed with the Federal Ministry of Education, Science and Research. These agreements mandate the university to set measurable targets, including conducting annual greenhouse gas (GHG) inventories, publishing a climate-neutrality roadmap, and integrating sustainability into operations and teaching. The rationale behind this policy framework is to ensure that the university acts as a role model in driving the national transition toward a low-carbon economy. The university's energy profile includes electricity from the grid, district heating, and a growing proportion of on-site renewable generation, particularly solar PV. The infrastructure is mixed, comprising historic buildings—some dating back to the 19th century—and newly renovated or energy-retrofitted structures, making energy efficiency and renewables a priority. The University of Graz is proactively expanding solar energy capacity, with several photovoltaic systems already operational and plans to increase installations further. Additionally, the institution is committed to reducing building energy use intensity through technical upgrades and behavioural change campaigns.

The University of Graz has developed a comprehensive sustainability framework, reflected in several strategic documents and systems:

- Development Plan 2025–2030, outlining the strategic vision where sustainability is a central pillar.
- Environmental Policy 2024, defining the university's long-term commitment to preserving the environment through research, teaching, and operations (National Report Austria, section 2.3).
- Annual Environmental Statements, offering transparency through performance reports and environmental targets.
- Since 2016, the EMAS Environmental Management System (Eco-Management and Audit Scheme) has structured the university's sustainability governance. EMAS is

supported by the Rectorate and implemented by internal teams focusing on environmental risks, compliance, and improvement.

The university's leadership in environmental responsibility is reinforced by interdisciplinary, campus-wide learning initiatives such as staff engagement in ESD certification for university lecturers, which collectively support the integration of a sustainability-focused academic culture.

The **University of Montpellier** aligns its energy strategy with the French national framework, particularly the Tertiary Decree and Plan Vert mandates. The rationale for its energy policy is driven by legal requirements to develop institutional energy action plans and integrate sustainability into governance. With units located across Montpellier, Nîmes, Béziers, Sète, Mende, Perpignan, and Carcassonne, the university serves over 50,000 students, 5,000 staff, and manages 210 buildings (500,000 m²) and 100 hectares of undeveloped land. Its estate features a mix of historic buildings, 1960s–70s constructions (largely inefficient), and modern structures.

The university's energy use relies heavily on grid electricity and natural gas, with a gradual integration of solar PV systems. Energy retrofitting efforts include improved insulation, LED lighting, and HVAC upgrades.

Montpellier's sustainability management is framed by the Plan Vert, DD&RS label (for societal responsibility), and the Master Plan for Ecological Transition (2023), which outlines GHG diagnostics and targeted reductions. The Energy Conservation Plan, embedded in the SDTE (Sustainable Development and Ecological Transition Strategy), details concrete measures for energy efficiency and waste reduction.

The university's 2023–2025 Contract of Objectives, Means, and Performance (COMP) identifies ecological transition as a strategic priority. Across policy documents, decarbonisation, waste reduction, and biodiversity preservation are key objectives. Sustainability is also embedded in governance, curriculum, research, and community engagement, ensuring Montpellier's position as a national leader in campus sustainability transformation.

Notably, research structures occupy a quarter of the institution's space, highlighting its strong research presence. The real estate portfolio is diverse, featuring very old buildings, constructions from the 1960s and 1970s (mostly ageing and energy-inefficient), as well as new buildings. With buildings of varying ages, the university's energy consumption relies heavily on grid electricity and natural gas. Retrofitting for efficiency has been a key institutional response, with improvements in insulation, lighting, and HVAC systems. Solar PV integration has begun on select rooftops, though it currently remains in a pilot phase.

Montpellier's sustainability management is structured through the Plan Vert, which includes provisions for environmental governance, education, and operations. The university is also pursuing the DD&RS (Développement Durable & Responsabilité Sociétale) label for structured and audited sustainability commitment. As a priority of the University of Montpellier's 2021–2026 multi-year contract, the ecological transition is also a key focus of the 2023–2025 Contract of Objectives, Means, and Performance (COMP). The main documents setting the framework of sustainability management are the Master Plan for Ecological Transition and the Energy Conservation Plan. The Master Plan for Ecological Transition, adopted in 2023, aims to reduce the university's energy consumption and its

contribution to global warming. It includes a comprehensive diagnosis of greenhouse gas emissions across the university. The Energy Conservation Plan is part of the SDTE and focuses on reducing energy usage through various measures, such as improving energy efficiency in buildings and promoting sustainable practices. The decarbonisation of activities, reducing and managing waste, and protecting and promoting diversity are among the specific priorities of the university. Incorporating sustainability into governance structures, curricula, research, and community engagement is the priority integrated across the policy documents.

This legally anchored and systematically governed strategy ensures that the University of Montpellier is committed and proactive in implementing energy and sustainability measures across its campus.

The **University of Palermo (UNIPA)**, founded in 1806, is a leading Italian public institution in Sicily, serving around 40,000 students, with a growing share of international students, currently representing 6% of the student body.

The rationale behind the University of Palermo's energy policies is primarily driven by a commitment to environmental responsibility, financial efficiency, regulatory compliance, and academic leadership in sustainability. The Centre for Sustainability and Ecological Transition (CSTE) plays a pivotal role in advancing environmental policies, fostering research in sustainability, and promoting eco-friendly practices across all university sites. In 2022, the Centre for Sustainability and Ecological Transition (CSTE) was established to coordinate the activities of the University of Palermo aimed at achieving the 17 Sustainable Development Goals (SDGs). CSTE plays a pivotal role in advancing environmental policies, fostering research in sustainability, and promoting eco-friendly practices across all university sites. The work of the CSTE continues and expands the activities already carried out by the university in the fields of energy consumption reduction, waste management, and sustainability.

The university recognises the importance of reducing its environmental impact, aligning its operations with national and international sustainability goals, such as Italy's National Energy Strategy and the European Green Deal. In practice, this is reflected in the adoption of energy-efficient technologies, such as the installation of photovoltaic panels, the upgrade of heating and cooling systems, and the implementation of energy-saving measures like LED lighting and automatic control systems. These actions not only contribute to lowering the university's carbon footprint but also result in significant cost savings, as demonstrated by the reduction in electricity consumption. The reduction in energy expenses reflects successful cost-saving measures that also contribute to the university's overall budget optimisation.

The university relies mainly on grid electricity, with substantial efforts toward reducing consumption. The electrical energy is essentially used for cooling the buildings (by using centralised or autonomous heat pump systems), lighting, heating part of the buildings, and other services (including the data centre). The heating systems operate on natural gas, showing the university's ongoing reliance on fossil fuels for thermal energy. However, the university is gradually integrating renewable energy sources, such as solar panels, in various locations across the campus. These contribute to reducing reliance on the grid and support the university's goals to lower its carbon footprint. Its campus profile—with a mix of historic and modern buildings—necessitates a phased and adaptive approach. The main university buildings are of historical value, many built before energy efficiency standards were in place, which presents a significant challenge for energy renovation.

Research and projects on renewable energy should be noted as a way to accelerate progress toward more sustainable and distributed energy solutions. Among the documents framing the energy strategy at UNIPA, the University Energy Plan should be mentioned. It defines the future energy scenarios based on the analysis of the current situation (analysis of project documentation, energy bills, online platform data, physical inspections, etc.).

Among the specific goals of UNIPA, the Energy Efficiency Projects remain a strong priority, as well as Sustainability Awareness Campaigns (among them, initiatives highlighting energy-saving practices and the responsible use of resources).

Although Italy does not impose binding energy or climate obligations on HEIs, the University of Palermo has a clear sustainability-oriented trajectory, structured across several key institutional and national frameworks.

UNIPA's broad approach to sustainability integrates environmental, financial, and educational objectives, reinforcing the university's commitment and the scope of action. University not only ensures compliance but also strengthens its role as a model for sustainability in higher education. While the national framework provides a foundation, UNIPA distinguishes itself by pursuing additional, innovative actions, as in the case of the RUS network, where the university plays a leading role, not only as a co-founder but also as a coordinator for sustainability initiatives in Sicily.

Vilnius Gediminas Technical University – VILNIUS TECH is characterised by its focus on Technological and Engineering education and research, hosting an academic community of 9,000 students and 1,600 staff members, including 940 academic staff.

The university's rationale combines institutional autonomy with peer accountability and positions sustainability as a cross-cutting university action priority in its Strategy 2023–2030. To coordinate sustainability initiatives, the university established a Sustainability Centre in 2022, with a focus on interdisciplinary education and training activities on campus.

Operating on a compact, centralised campus, VILNIUS TECH benefits from recent upgrades in line with nearly-zero energy building standards. Its energy use relies on district heating, grid electricity, and a limited but expanding collaboration with external stakeholders on sustainability matters. However, managing a mix of newly built premises with historical heritage and buildings from the late '70s, the university focuses on facilitating a data-driven approach to infrastructure planning and energy savings. Energy consumption is tracked with building-level smart meters. Renewables (solar PV installations) are among the highest priorities in the near future.

Institutional strategies are formalised in the VILNIUS TECH Development Plan, which integrates sustainability with digital innovation and technical education.

Several faculties incorporate sustainability-focused curricula, while campus operations emphasise measurable energy performance with the specific goals:

- Expanding solar PV capacity, particularly on new construction,
- Promoting low-energy design principles in renovated buildings,
- Leading in sustainability education and training within Lithuania.

VILNIUS TECH's technology-oriented profile makes it well-positioned to serve as a partner for solving sustainability challenges, especially in building energetics, green energy, and waste management areas.

The **University of Novi Sad (UNS)**, with almost 50,000 students and 5,000 employees at 14 faculties and three institutes in four historic university cities—Novi Sad, Sombor, Subotica, and Zrenjanin—is one of the largest educational and research centres in Central Europe.

The university operates under general public-sector energy efficiency regulations, such as Serbia's Climate Change Law (2021) and the Energy Law. According to the national report, the university has begun developing its institutional energy policy in response to both national strategic goals and the need for improved infrastructure performance. Its rationale centres on increasing energy efficiency, modernising infrastructure, and reducing operating costs. UNS utilises a mix of traditional and renewable energy sources. The university spans more than 100 buildings; parts of the campus still rely on outdated systems, which present a challenge to achieving energy efficiency goals. While grid electricity and natural gas remain primary sources for daily operations, efforts have been made to integrate renewable energy solutions and improve energy efficiency across the campus. Current energy use patterns rely on electricity, natural gas, and district heating, with a few pilot PV installations under development. Infrastructural complexity and administrative fragmentation are cited as barriers to coordinated action, but steps have been taken to appoint energy managers and initiate campus-wide energy audits.

While UNS does not have a standalone energy policy, energy concerns are embedded within broader initiatives such as infrastructure modernisation, research on sustainability, and participation in international projects like Horizon Europe, EU Interreg, and Erasmus+. These frameworks often emphasise resource efficiency and green campus initiatives and facilitate the gradual integration of sustainability topics into the university's Development Strategy. UNS has developed an Action Plan for Sustainable Energy (SEAP) in Novi Sad, which will facilitate future activities in terms of energy efficiency projects, renewable energy adoption, and public awareness campaigns. Partnerships with national and international partners and the use of external agency funding are accelerating the transition of the university towards a more holistic and complex strategy-making on sustainability. Considering current institutional needs, the specific institutional goals include:

- Upgrading infrastructure to increase energy efficiency and enhance reliability in critical operations;
- Deploying renewable energy sources like solar power, contributing to a low-carbon economy;
- Raising awareness among students and staff about energy-saving practices and the importance of sustainability, fostering long-term cultural change.

As one of Serbia's leading institutions, UNS plays a vital role in regional development. An energy policy would position the university as a leader in sustainable development for the community and businesses and help achieve Serbia's national and EU-aligned climate goals.

The **University of Alicante (UA)** is a public university with approximately 30,000 students enrolled and over 4,000 employees, of which around 2,500 are academic staff and 1,500 administrative staff. The university campus covers 1,000,000 m², with access to an additional 1,000,000 m² for expansion. It is located near the city of Alicante, featuring purpose-built

infrastructure with substantial potential for efficient energy management and renewable energy development. Moreover, the university has several university centres located in towns of the province (Alicante, Biar, Calpe, Cocentaina, Elda, La Nucía, Petrer, Torrevieja, Benissa, Orihuela, Villena, Xixona & Villajoyosa) where academic and cultural activities are carried out. Many of these activities are related to the socio-economic and cultural environment of the locality. As emphasised in the national report, due to the decentralised nature of Spain, different strategies and policies (national, regional, and local long-term strategies) in the field of Energy & Climate shape the University of Alicante.

UA's energy strategy is driven by both compliance with national public-sector energy efficiency regulations and its institutional objective of becoming a model of green campus transformation. This involves energy audits, real-time energy monitoring, integration of renewable energy systems, and awareness campaigns targeting the university community. The university's energy use combines grid electricity, district heating, and a growing proportion of solar PV installations. Through its centralised energy monitoring platform (Sistema de Gestión Energética), UA actively manages energy consumption and targets inefficient buildings for intervention. The university's "UA Campus Sostenible" initiative integrates these measures into daily operations and planning. The University Social Responsibility Plan reflects the aim to reduce and compensate for GHG emissions and combat climate change, which includes, among others, proposals for energy-saving mechanisms for buildings, in accordance with the GHG Emissions Protocol or standards based on said protocol. Agenda 21, which is included in the general UA Social Responsibility Plan, establishes the Strategic Line on efficient use of energy, with corresponding measures. The aim of this strategic line is to maximise energy savings and promote clean and renewable energies. Actions are therefore proposed to improve the energy management of the UA Campus, both through the optimisation of facility consumption and the application of renewable energy sources. The specific goals of the university include:

- Achieving the 10% public-sector energy reduction target imposed by national RDL 14/2022;
- Scaling photovoltaic systems across campus buildings;
- Enhancing student engagement through workshops and mobility programs;
- Positioning the university as a regional sustainability leader and reference point.

Institutional Involvement for Action

The overview of the institutional practices was complemented by the analysis of the distribution of the roles in different activities, which range from decision making to implementation of the corresponding strategy on Energy resources. This survey was aimed at activating stakeholder-engagement focus when analysing institutional practices. The aggregated results of partner reports show who the actors are responsible for setting strategies and guidelines, monitoring, evaluation, reporting and communication in the academic communities. The main aim of this part is to identify how responsibilities for implementation are shared, and who are the main actors responsible for setting strategies and guidelines, monitoring, evaluation, reporting and communication on the goals, action and results. The main question beyond is how the participation and engagement level of the academic community is ensured. The data for this part of the report was collected in a structured manner by assessing the role of different target groups: function, main actors,

student and staff engagement. The engagement has been assessed using a 5-point Likert scale.

Developing strategy. Strategic decision-making, setting strategic goals, measures and guidelines

The development of strategic energy-saving goals and guidelines across the analysed countries is primarily led by high-level university authorities such as chancellors, rectors, or executive departments. While collaboration typically includes academic and facility management units, the involvement of students varies significantly. Overall, student engagement in this phase is relatively low, with most countries rating it between 2 and 3, except for Lithuania, which stands out with a higher level of inclusion. In contrast, staff engagement is consistently stronger, with most institutions reporting moderate to high involvement, particularly in Lithuania, Italy, and France.

Developing strategy. Strategic decision-making, setting strategic goals, measures and guidelines	
MAIN IMPLEMENTING BODIES, UNITS. ACTORS	In all countries, strategic planning is led by high-level university authorities such as chancellors, rectors, vice-presidents, or top-level management units.
CONTRIBUTING, COLLABORATING UNITS, BODIES, GROUPS OF ACTORS (E.G FACILITY MANAGEMENT UNIT, STUDENTS, STAFF)	Collaboration involves a mix of academic bodies, facility managers, and student representatives or environmental groups, with varying levels of student input across countries.
EVALUATE TO WHAT EXTENT THIS ACTION INFLUENCES THE INDIVIDUAL ENGAGEMENT OF THE STUDENT	Student engagement is relatively low in most countries (average 2.5), with Lithuania being the only one rating it high at 4.
EVALUATE TO WHAT EXTENT THIS ACTION INFLUENCES THE INDIVIDUAL ENGAGEMENT OF THE STAFF (ADMIN + ACADEMIC)	Staff engagement is generally moderate to high (average 3.5), with the highest involvement seen in Lithuania, Italy, and France.

Developing an Institutional Action Plan

The development of institutional action plans is managed by senior university bodies such as chancellors, rectorates, and management departments across all countries. While collaboration involves student representatives, technical staff, and environmental units, the extent of stakeholder involvement varies. Student engagement in this process is consistently low, indicating that this task has limited influence on encouraging individual student participation. In contrast, staff engagement is moderate to high, especially in Italy and France, where both administrative and academic staff appear to be more actively involved.

Developing institutional Action Plan

MAIN IMPLEMENTING BODIES, UNITS. ACTORS	High-level university authorities such as chancellors, rectorates, councils, and management departments are responsible for institutional action planning across all countries.
CONTRIBUTING, COLLABORATING UNITS, BODIES, GROUPS OF ACTORS (E.G FACILITY MANAGEMENT UNIT, STUDENTS, STAFF)	Collaboration includes student representatives, technical and administrative units, and environmental groups, with stakeholder involvement varying in scope.
EVALUATE TO WHAT EXTENT THIS ACTION INFLUENCES THE INDIVIDUAL ENGAGEMENT OF THE STUDENT	Student engagement is consistently low (average 2.3), showing limited influence of this task on individual student participation.
EVALUATE TO WHAT EXTENT THIS ACTION INFLUENCES THE INDIVIDUAL ENGAGEMENT OF THE STAFF (ADMIN + ACADEMIC)	Staff engagement is moderate to high (average 3), with Italy and France indicating a stronger involvement of administrative and academic staff in this action.

Setting energy resource management KPIs

The process of setting energy resource management KPIs is led by top university bodies such as rectorates, chancellors, or internal and environmental management departments, often supported by faculty or facilities units. Collaboration typically involves technical departments, research structures, and, in some cases, student or environmental organizations. Student engagement in KPI setting is minimal across all countries, with an average score of just 1.7, indicating little influence on student involvement. Staff engagement is slightly better (average 2.7), with France standing out as the country reporting the highest level of staff participation in this area.

Setting energy resource management KPIs	
MAIN IMPLEMENTING BODIES, UNITS. ACTORS	KPI setting is handled by top university entities such as chancellors, rectorates, internal audit offices, or environmental management departments, often in coordination with faculty or property units.
CONTRIBUTING, COLLABORATING UNITS, BODIES, GROUPS OF ACTORS (E.G FACILITY MANAGEMENT UNIT, STUDENTS, STAFF)	Supporting roles are played by technical departments, planning units, research structures, and student or environmental organizations depending on institutional setup.
EVALUATE TO WHAT EXTENT THIS ACTION INFLUENCES THE INDIVIDUAL ENGAGEMENT OF THE STUDENT	Student involvement is minimal across all countries (average 1.7), showing very limited influence on student engagement in KPI setting.
EVALUATE TO WHAT EXTENT THIS ACTION INFLUENCES THE INDIVIDUAL ENGAGEMENT OF THE STAFF (ADMIN + ACADEMIC)	Staff engagement is moderate (average 2.7), France shows the highest level of staff participation in this action.

Providing resources for implementation

The provision of resources for implementation is overseen by departments handling finance, property, or energy, typically operating under high-level university management. Collaboration involves administrative, academic, and technical units, along with occasional input from student unions and environmental groups. Student engagement in this area is mixed (average 2.7), with limited involvement in Spain, Italy, and France, but higher ratings in Serbia and Austria. Staff engagement is comparatively strong (average 3.5), especially in Austria, France, and Serbia, highlighting the central role of academic and administrative personnel in resource allocation.

Providing resources for implementation	
MAIN IMPLEMENTING BODIES, UNITS. ACTORS	Resource provision is primarily managed by departments responsible for finance, property, facilities, or energy, typically under executive or top-level oversight.
CONTRIBUTING, COLLABORATING UNITS, BODIES, GROUPS OF ACTORS (E.G FACILITY MANAGEMENT UNIT, STUDENTS, STAFF)	Support comes from administrative, academic, and technical units, with some involvement from student unions and environmental advisory groups.
EVALUATE TO WHAT EXTENT THIS ACTION INFLUENCES THE INDIVIDUAL ENGAGEMENT OF THE STUDENT	Student engagement varies (average 2.7), with low scores in Spain, Italy, and France, but higher involvement seen in Serbia and Austria.
EVALUATE TO WHAT EXTENT THIS ACTION INFLUENCES THE INDIVIDUAL ENGAGEMENT OF THE STAFF (ADMIN + ACADEMIC)	Staff engagement is stronger overall (average 3.5), especially in Austria, France, and Serbia, suggesting a key role for academic and administrative staff in implementation.

Developing infrastructure

Infrastructure development is generally managed by property and facility management departments, rectorates, or through outsourcing, depending on the national context. Collaboration involves technical, administrative, and planning units, alongside environmental and student-focused groups such as Green Buddies. Student engagement in this area is moderate overall (average 2.8), with Serbia showing the highest involvement; Lithuania did not report data. Staff engagement is more consistent and generally high (average 3.5), with the strongest participation seen in Italy, and solid involvement across France, Serbia, and Austria.

Developing infrastructure	
MAIN IMPLEMENTING BODIES, UNITS. ACTORS	Infrastructure development is typically led by property and facility management departments, rectorates, or outsourced providers, depending on the country.

CONTRIBUTING, COLLABORATING UNITS, BODIES, GROUPS OF ACTORS (E.G FACILITY MANAGEMENT UNIT, STUDENTS, STAFF)	Support comes from technical or administrative units, infrastructure planning offices, or environmental and student-focused groups like Green Buddies.
EVALUATE TO WHAT EXTENT THIS ACTION INFLUENCES THE INDIVIDUAL ENGAGEMENT OF THE STUDENT	Student engagement varies across countries (average 2.8), with the highest engagement in Serbia and moderate involvement in France and Austria; Lithuania does not provide data (n.a).
EVALUATE TO WHAT EXTENT THIS ACTION INFLUENCES THE INDIVIDUAL ENGAGEMENT OF THE STAFF (ADMIN + ACADEMIC)	Staff engagement is moderate to high (average 3.5), with the highest participation reported in Italy and consistently good involvement across France, Serbia, and Austria.

Implementing the strategy or action plan

The implementation of energy strategies or action plans is generally overseen by facility or property management departments, rectorates, or high-level operational units. Collaborative efforts involve academic staff, students, administrative teams, external contractors, and green/environmental groups, with some countries allowing voluntary participation. Student engagement in implementation is moderate to high (average 3.2), with Serbia and France showing the most active student involvement. Staff engagement is notably strong across the board (average 4.2), particularly in Serbia, Italy, and Austria, highlighting a key role for staff in bringing action plans into practice.

Implementing the strategy or action plan	
MAIN IMPLEMENTING BODIES, UNITS. ACTORS	Implementation is typically led by facility or property management units, rectorates, or high-level departments responsible for infrastructure and operations.
CONTRIBUTING, COLLABORATING UNITS, BODIES, GROUPS OF ACTORS (E.G FACILITY MANAGEMENT UNIT, STUDENTS, STAFF)	Collaboration includes academic staff, students, administrative units, external contractors, and green/environmental groups, with flexibility for voluntary contributions in some countries.
EVALUATE TO WHAT EXTENT THIS ACTION INFLUENCES THE INDIVIDUAL ENGAGEMENT OF THE STUDENT	Student engagement is moderate to high (average 3.2), with the strongest involvement in Serbia and France.
EVALUATE TO WHAT EXTENT THIS ACTION INFLUENCES THE INDIVIDUAL ENGAGEMENT OF THE STAFF (ADMIN + ACADEMIC)	Staff engagement is very high in most countries (average 4.2), especially in Serbia, Italy, and Austria, indicating strong participation in implementation activities.

Organising community engagement

Organising community engagement is primarily managed by communication departments, rectorates, or high-level administrative units dedicated to outreach. Collaboration spans communication offices, student groups, academic and technical staff, as well as environmental and stakeholder organizations. Student engagement in this area is

exceptionally high (average 4.5), with Lithuania, Serbia, France, and Austria all reporting the highest possible score. Similarly, staff engagement is also strong (average 4.3), particularly in those same countries, highlighting robust participation across the university community.

Organising community engagement	
MAIN IMPLEMENTING BODIES, UNITS. ACTORS	Responsibility typically lies with communication departments, rectorates, and administrative or top-level management units focused on outreach and engagement.
CONTRIBUTING, COLLABORATING UNITS, BODIES, GROUPS OF ACTORS (E.G FACILITY MANAGEMENT UNIT, STUDENTS, STAFF)	Collaboration includes communication offices, student associations, technical and academic staff, and environmental or stakeholder groups.
EVALUATE TO WHAT EXTENT THIS ACTION INFLUENCES THE INDIVIDUAL ENGAGEMENT OF THE STUDENT	Student engagement is very high overall (average 4.5), with Lithuania, Serbia, France, and Austria scoring the maximum of 5.
EVALUATE TO WHAT EXTENT THIS ACTION INFLUENCES THE INDIVIDUAL ENGAGEMENT OF THE STAFF (ADMIN + ACADEMIC)	Staff engagement is also high (average 4.3), especially in Lithuania, Serbia, and Austria, reflecting strong cross-community participation.

Monitoring (tracking) results and performance

Monitoring and tracking of results and performance are typically managed by facility/property departments, rectorates, or oversight bodies such as internal audit and compliance units. Collaborating entities include IT departments, technical teams, research structures, and both student and staff groups. Student engagement in monitoring is generally low (average 2.3), with Lithuania and Spain at the bottom (score 1), and Serbia reporting the highest involvement (score 4). Staff engagement varies more (average 3.2), with strong participation in Austria and Serbia, while Lithuania and Spain again show minimal involvement.

Monitoring (tracking) results and performance	
MAIN IMPLEMENTING BODIES, UNITS. ACTORS	Monitoring activities are carried out by facility/property management units, rectorates, or specialized oversight bodies such as audit and compliance departments.
CONTRIBUTING, COLLABORATING UNITS, BODIES, GROUPS OF ACTORS (E.G FACILITY MANAGEMENT UNIT, STUDENTS, STAFF)	Collaboration includes IT departments, technical units, research structures, and student/staff groups depending on the institution.
EVALUATE TO WHAT EXTENT THIS ACTION INFLUENCES THE INDIVIDUAL ENGAGEMENT OF THE STUDENT	Student engagement in monitoring is generally low (average 2.3), with Lithuania and Spain scoring the lowest (1), and Serbia the highest (4).

EVALUATE TO WHAT EXTENT THIS ACTION INFLUENCES THE INDIVIDUAL ENGAGEMENT OF THE STAFF (ADMIN + ACADEMIC)	Staff engagement varies more widely (average 3.2), with Austria and Serbia reporting high involvement, while Lithuania and Spain show minimal staff participation.

Evaluating results and providing feedback

Evaluation and feedback processes are overseen by institutional governing bodies such as rectorates, councils, deans, or quality assurance and environmental departments. Key contributors include IT and communication units, academic staff, and student bodies, with some institutions also involving strategic planning teams. Student engagement in this task varies notably (average 2.8), with Lithuania showing the strongest involvement and Spain the weakest. Staff engagement follows a similar pattern (average 3.8), peaking in Lithuania and Austria and again being lowest in Spain, reflecting a diverse range of institutional approaches to feedback participation.

Evaluating results and providing feedback	
MAIN IMPLEMENTING BODIES, UNITS. ACTORS	Evaluation and feedback are managed by governing bodies such as rectorates, councils, deans, quality assurance units, or environmental departments.
CONTRIBUTING, COLLABORATING UNITS, BODIES, GROUPS OF ACTORS (E.G FACILITY MANAGEMENT UNIT, STUDENTS, STAFF)	Supporting contributors include IT and communication units, academic staff, and student bodies, with some countries engaging strategic planning departments.
EVALUATE TO WHAT EXTENT THIS ACTION INFLUENCES THE INDIVIDUAL ENGAGEMENT OF THE STUDENT	Student engagement in evaluation and feedback is mixed (average 2.8), with Lithuania showing the highest involvement and Spain the lowest.
EVALUATE TO WHAT EXTENT THIS ACTION INFLUENCES THE INDIVIDUAL ENGAGEMENT OF THE STAFF (ADMIN + ACADEMIC)	Staff engagement is stronger overall (average 3.8), with Austria and Lithuania reporting the highest participation, while Spain shows the weakest results.

Sustaining improvements, updating institutional practices

Sustaining improvements and updating institutional practices is overseen by top or executive-level university leadership such as rectorates, chancellors, and directors, who ensure long-term integration of energy-related measures. Supporting actors include strategic planning teams, technical units, academic staff, students, and environmental or quality assurance departments. Student engagement is moderate (average 2.8), with fairly uniform participation across most countries, though slightly lower in Italy. Staff engagement is notably high (average 4.2), especially in Italy and Austria, highlighting the essential role of academic and administrative staff in maintaining institutional progress.

Sustaining improvements, updating institutional practices	
MAIN IMPLEMENTING BODIES, UNITS. ACTORS	Responsibility lies with top or executive-level management, including rectorates, chancellors, and directors, who oversee the long-term integration of energy practices.
CONTRIBUTING, COLLABORATING UNITS, BODIES, GROUPS OF ACTORS (E.G FACILITY MANAGEMENT UNIT, STUDENTS, STAFF)	Support units include strategic planning departments, technical units, students, academic staff, and environmental or quality assurance teams.
EVALUATE TO WHAT EXTENT THIS ACTION INFLUENCES THE INDIVIDUAL ENGAGEMENT OF THE STUDENT	Student engagement is moderate overall (average 2.8), with similar levels across most countries, and slightly lower in Italy.
EVALUATE TO WHAT EXTENT THIS ACTION INFLUENCES THE INDIVIDUAL ENGAGEMENT OF THE STAFF (ADMIN + ACADEMIC)	Staff engagement is high (average 4.2), particularly in Italy and Austria, indicating that institutional updates rely heavily on administrative and academic staff input.

Communication of the strategy, action results

Communication of the strategy and its outcomes is overseen by rectorates, communication departments, or other high-level units depending on the country. Key collaborators include central communication teams, Ecocampus offices, students' parliaments, green councils, academic and administrative staff, faculties, institutes, schools, student unions, and external partners. Student engagement in communication activities is moderate overall (average 3.3), it is high in Lithuania, Italy, Serbia, and France, lowest in Spain and Austria. Staff engagement is generally strong (average 4) among almost all observed countries, with Serbia showing the highest outcome. Spain reports the lowest engagement.

Communication of the strategy, action results	
MAIN IMPLEMENTING BODIES, UNITS. ACTORS	Communication efforts are managed by rectorates, communication departments, or top-level units involved in the strategy, depending on the country.
CONTRIBUTING, COLLABORATING UNITS, BODIES, GROUPS OF ACTORS (E.G FACILITY MANAGEMENT UNIT, STUDENTS, STAFF)	Key contributors include central communication units, green/environmental groups, academic staff, students, and external partners.
EVALUATE TO WHAT EXTENT THIS ACTION INFLUENCES THE INDIVIDUAL ENGAGEMENT OF THE STUDENT	Student engagement in communication activities is moderate overall (average 3.3), with Lithuania, Serbia, Italy, and France showing higher involvement, while Spain and Austria remain weaker.
EVALUATE TO WHAT EXTENT THIS ACTION INFLUENCES THE INDIVIDUAL ENGAGEMENT OF THE STAFF (ADMIN + ACADEMIC)	Staff engagement is generally strong (average 4), with Serbia achieving the highest involvement, while Spain records the lowest outcome.

2. IDENTIFY BEST PRACTICES AND CHALLENGES

The second report was dedicated to gain a deeper understanding of existing experiences, past practices, and emerging issues. Therefore, partner universities were asked to identify the challenges they had encountered and the best practices they had implemented in the sustainable management of energy resources. The collected cases reflect technical and infrastructural innovations, as well as behavioural change, stakeholder engagement and learning-driven initiatives. The following table 2 provides a comparative summary of the key challenges and best practices identified by each partner institution.

Table 2. Comparative summary of the key challenges and best practices identified by each partner institution

	BEST PRACTISES
University of Graz (Austria)	1. Institutional Carbon Management 2. Efficient Electrical Energy Use
University of Montpellier (France)	1. A set of small actions to raise awareness among campus users about ecological transition and reducing energy consumption 2. Implementing management actions to save energy at a central level
University of Palermo (Italy)	1. Energy Consumption Monitoring Platform 2. Photovoltaic Systems Installation 3. Energy Awareness Campaigns 4. Development of a Greenhouse Gas Emissions Inventory and Estimation of the University's Carbon Footprint
VILNIUS TECH (Lithuania)	1. VILNIUS TECH Participation in Project for Students' Engagement in Energy-Saving Practice (Project SAVES / Student Switch Off) 2. Launching Sustainability Hub in VILNIUS TECH
University of Novi Sad (Serbia)	1. GReENERGY – Greening the cities 2. GReENERGY2.0 – Greening the cities 2.0 3. CREATEGREEN – Creating energy and environment conditions for greener and sustainable Croatia-Serbia cross-border region
University of Alicante (Spain)	1. Renewable Energies: Consumption & Installation 2. Carbon Footprint Calculation 3. Energy Consumption Monitoring & Smart University 4. Desalination Plant
	CHALLENGES
University of Graz (Austria)	1. Thermal Energy Dependence 2. Mobility and Business Travel
University of Palermo (Italy)	1. Bureaucratic Hurdles in Procurement, Installation, and Funding 2. Lack of Institutionalized Roles for Energy Management
VILNIUS TECH (Lithuania)	1. Maintaining student motivation and engagement in long-term campaigns 2. Technical difficulties with energy monitoring dashboard 3. COVID-19 disrupting in-person activities

	4. Transition from EU funding to self-funded model (financial sustainability issues)
University of Novi Sad (Serbia)	1. Structural and technological barriers (e.g., retrofitting old buildings) 2. Financial challenges (e.g., funding large-scale projects) 3. Socio-cultural barriers (e.g., lack of awareness and behavioral resistance)
University of Alicante (Spain)	1. Financial challenges – High investment costs for energy projects 2. Structural challenges – Aging buildings needing deep retrofitting for energy efficiency

The University of Graz presents two **best practices** in sustainable energy management.

Firstly, the university's Institutional Carbon Management (ICM) system takes a strong, data-driven approach to achieving climate neutrality by 2040. This initiative is notable for its high-level leadership, with the Rector personally chairing the Climate Protection Advisory Board, as well as for its interdisciplinary collaboration between scientists and administrative units. The project integrates detailed emissions tracking and stakeholder participation, engaging staff, students and faculty alike, and embeds sustainability goals within institutional governance.

The second case study, 'Efficient Electrical Energy Use', showcases technical measures to reduce energy consumption and promote the use of renewable energy sources. These measures include switching to UZ46-certified green electricity, retrofitting infrastructure with LED lighting and expanding photovoltaic systems. These measures are supported by strong institutional investment and strategic prioritisation.

Both cases can be easily transferred to other HEIs, provided there is institutional will, clear role allocation, and access to reliable green electricity sources.

Emphasising challenges, the **University of Graz** has identified two **main challenges** to achieving its sustainability goals: dependence on thermal energy and emissions related to mobility.

The university’s reliance on district heating, which uses a non-renewable energy mix, creates structural and policy-related barriers that limit its autonomy when transitioning to renewable thermal energy. The problem regarding district heating is more about dependency than financial aspects, although geothermal systems are being integrated into new buildings and renovation projects are ongoing.

The second challenge relates to emissions from mobility, including commuting and business travel. Although the modal split among commuters is favourable, infrastructure gaps and behavioural barriers hinder progress towards low-carbon mobility. The introduction of the Green Academia Award and collaboration with local authorities are proactive steps to incentivise behavioural change and improve transport options.

Insights from interviews and focus groups further emphasise the need for greater investment in renewable energy technologies and improved data analytics for energy monitoring, as well as more integrated sustainability governance. While the EMAS scheme provides a solid

institutional framework, challenges remain at departmental level where motivation and engagement can be inconsistent. Socio-cultural factors, such as individual energy-use habits and limited community engagement initiatives, are also frequently overlooked. The university recognises that building a sustainable energy culture requires commitment at the highest level, embedded policies, clear accountability structures and targeted engagement. Tools such as workshops, awareness campaigns and leadership role modelling are seen as essential to driving organisational transformation and individual behavioural change on campus and beyond.

The **University of Montpellier** takes a dual approach to energy transition, combining community-driven behavioural change with institutional-level management actions.

The first **best practice** focuses on raising awareness through small yet strategic actions, such as visible energy consumption reporting, a network of sobriety ambassadors and targeted staff training in ecological transition. The practical behaviour guidelines are particularly commendable for being easy to implement and highly transferable.

The second best practice focuses on a structured energy management system (EMS) and operational measures to reduce consumption. These include climate-based heating adjustments, automatic lighting and computer shutdown systems, HVAC optimisations, sub-metering and building renovations, many of which are supported by strategically mobilised national and regional funding. The initiative demonstrates robust institutional planning and strong alignment with national targets, notably the 40% reduction stipulated by France's Tertiary Decree. A notable strength is the integration of ecological transition into curricula and training programmes, ensuring long-term impact.

The main identified **challenge** is financial scale: achieving the full renovation target requires approximately €200 million, highlighting the need for sustained external investment. Nevertheless, Montpellier's comprehensive, multi-level model offers HEIs a robust, replicable framework for combining behaviour change with technical upgrades.

The **University of Palermo** provided several **best practices**, including the development of a real-time energy consumption monitoring platform designed to detect unnecessary energy use and enable immediate corrective action.

Another significant initiative is the installation of photovoltaic systems, which are intended to reduce reliance on fossil fuels and lower operational energy costs.

Following the 2022 energy crisis, the university launched energy awareness campaigns focusing on behavioural change through targeted communication, workshops and practical energy-saving tips for staff and students.

Another noteworthy practice is the development of a comprehensive greenhouse gas emissions inventory and carbon footprint estimation, coordinated by the Centre for Sustainability and Ecological Transition (CSTE). This initiative is notable for its strong stakeholder engagement, alignment with national and international sustainability targets, and use of the campus as a testing ground for innovative solutions.

Despite these advances, the university is facing two key **challenges**.

Firstly, bureaucratic hurdles in procurement, installation and funding delay the implementation of energy-efficient technologies, thereby increasing costs and undermining progress towards institutional targets.

Secondly, the absence of formalised institutional roles for energy management results in fragmented leadership and limited accountability, as responsibilities are frequently distributed informally among staff or academic personnel.

These challenges highlight the need for streamlined administrative processes, secured financial resources and dedicated sustainability roles to ensure the long-term effectiveness and coordination of energy transition efforts.

Vilnius Gediminas Technical University provided several **best practices**.

SAVES (Students Achieving Valuable Energy Savings) project is a dormitory-based behavioural change initiative, which has been rolled out across five EU countries. As part of the Student Switch Off campaign, students competed to reduce energy use with the support of dormitory coordinators, student ambassadors and a real-time energy dashboard that made saving energy more engaging. The project successfully promoted behavioural change, resulting in strong long-term habit retention and quantifiable energy savings. Face-to-face interactions proved to be the most effective engagement method, reinforcing the importance of combining digital tools with direct communication.

Another significant best practice is the Sustainability Hub, a multidisciplinary living lab established in 2022 to integrate sustainability research, education and stakeholder collaboration. The Hub features advanced data modelling zones, eco-design and sustainable consumption labs, indoor air quality monitoring and interdisciplinary learning programmes. Its open structure encourages participation from the academic community, schools, businesses and the wider public. The micro-credential modules are particularly innovative, promoting lifelong learning in energy efficiency, green technologies, and circular economy practices.

Despite these achievements, VILNIUS TECH has faced several **challenges**.

Within the SAVES project, it proved difficult to maintain student motivation over time, especially during the pandemic, as well as to ensure the technical reliability of the energy dashboard system. The transition from EU funding to self-funding raised concerns about financial sustainability, ultimately contributing to the project's discontinuation. The project's legacy highlights the importance of diverse and stable funding sources, robust engagement strategies, and the early involvement of IT and energy managers in technical planning.

The Sustainability Hub's experience has also revealed that engaging with external partners and enabling long-term cooperation are key to achieving impactful outcomes.

These initiatives demonstrate that success in sustainable energy management depends not only on technical solutions, but also on culture-building, cross-sector partnerships and sustained institutional commitment.

The **University of Novi Sad** provided several **best practices**, including the GReENERGY, GReENERGY 2.0 and CREATEGREEN projects.

The GReENERGY project involved installing solar power (213 kW), green roofs and walls on public buildings, achieving reduced energy consumption and increased public awareness in two cities.

Building on this foundation, GReENERGY 2.0 introduced additional solar installations and a green wall, along with workshops and open-door events to engage local communities.

CREATEGREEN builds on this model by installing solar power plants in Novi Sad, Sombor and Osijek. These are combined with micro-meteorological sensors and data-driven platforms to monitor solar energy efficiency across the region.

These initiatives are notable for their innovative combination of green infrastructure, stakeholder collaboration, community engagement and tangible renewable energy outcomes. They serve as scalable examples for HEIs seeking large-scale infrastructure change aligned with EU objectives.

The university identified several **key *challenges*** as well.

Structurally, retrofitting older public buildings for solar panels and green infrastructure posed significant logistical and technical challenges.

Financially, securing sufficient investment and ensuring project continuity without external support remained critical obstacles, even with EU co-funding.

Socio-culturally, limited awareness among stakeholders threatened the adoption and maintenance of sustainable practices. Although awareness campaigns and workshops helped to mitigate this issue, achieving broader uptake depended on consistent stakeholder engagement.

Overall, the successful implementation of projects, particularly in cross-border HEI settings, relied on continued funding diversification, strong multi-sector partnerships, clear policy frameworks and strategies to build a culture of sustainability across institutional and community levels.

The **University of Alicante** identified several sustainable energy management **best practices**.

Notably, it only imports renewable electricity and has installed extensive photovoltaic systems across campus, producing over 400,000 kWh per year. A new project involving 3,612 solar panels is set to supply 15.35% of the university's annual energy demand, reducing CO_2 emissions by 772 tonnes each year. These initiatives are led by the Vice-Rectorate of Infrastructure and supported by the Technical Office and Ecocampus.

Another effective measure is the annual calculation of the carbon footprint (Scope 1+2), which tracks and guides reductions in emissions and is backed by the Ministry's official calculator. Since 2017, emissions have dropped from 8,766 tCO_2 to 778 tCO_2.

The university also uses a real-time energy monitoring platform (SIEMENS) and participates in the Smart University initiative, which optimises energy use, detects inefficiencies and informs strategy.

Another best practice is the university's desalination plant, which has been operational since 1996. This reverse osmosis facility produces 360 m^3 of water per day, primarily for irrigation purposes, and it is also used for research and training. Current efforts are underway to power the plant using photovoltaic energy to enhance its sustainability.

These practices can be transferred, particularly thanks to strong leadership, cross-departmental collaboration and public-private partnerships.

The main **challenges** are financial and structural.

Upgrading old infrastructure to improve energy efficiency requires significant investment. To overcome this challenge, the university partnered with Endesa X, which financed the solar installations in full with deferred payment terms.

Structural inefficiencies in older buildings, particularly with regard to thermal insulation and HVAC upgrades, remain a hurdle.

Behavioural change is encouraged through awareness campaigns and environmental volunteering, but technical upgrades have a far greater impact. Other requirements include improved interior lighting, better climate control systems and funding for efficiency upgrades. Although engagement is growing, individual behavioural change has a limited effect compared to systemic infrastructure improvements.

3. ASSESS EXISTING ENERGY KPIs AND DATA

The aim of this report is to identify and evaluate existing data on energy KPIs within HEIs. This involves specifying KPI metrics, assessing the availability and reliability of current data sources, and identifying gaps such as missing or unmonitored KPIs. The goal is to create a solid foundation for a roadmap of existing practices.

The report contains a detailed compilation of energy-related KPIs from six European universities. It includes:

- Tracked KPIs: Such as electricity and heating consumption, energy efficiency, renewable energy use and generation, and energy savings.
- Data Sources: Where and how each university collects its energy data.
- Data Availability: Which data is complete, partial, or missing.
- Unmonitored KPIs: Important metrics that are not yet tracked, like carbon intensity, energy intensity, and waste heat utilisation.

Each university's section follows the same structure, making it easy to compare practices and identify gaps in energy monitoring across institutions.

3.1 OVERVIEW OF THE TRACKED ENERGY KPIs

This section provides a comparative summary of the energy-related KPIs currently monitored by participating universities. It highlights the types of energy metrics tracked, including electricity and heating consumption, energy efficiency, and renewable energy use. This provides insight into each institution’s focus areas and data maturity level. The overview serves as a foundation for identifying best practices and areas needing improvement across the institutions. The detailed comparison is presented in Table 2, and in Table 3 all common KPI are presented.

Table 2. Detailed comparison of monitored KPIs

KPI CATEGORY	MONTPELLIER	UNI GRAZ	UNS	VILNIUS TECH	UNIPA	UA
Electricity Consumption	✓	✓	✓	✓	✓	✓
Heating Consumption	✓	✓	✓	✓	✓	✗
Energy Efficiency	✗	✓	✓	✓	✓	✓
Energy Savings	✗	✓	✗	✗	✓	✓
Renewable Energy Consumption	✗	✓	✗	✓	✓	✓

Table 3. KPIs which are tracked in each university

UNIVERSITY	TRACKED KPIS
University of Montpellier (France)	Total electricity and gas consumption
University of Graz (Austria)	Electricity and heating consumption, energy efficiency, renewable energy use and generation, energy savings
University of Novi Sad (Serbia)	Electricity and heating consumption, energy efficiency
Vilnius Gediminas Technical University (Lithuania)	Electricity and heating consumption, energy efficiency, renewable energy use and generation
University of Palermo (Italy)	Electricity and gas consumption, energy efficiency, renewable energy use and generation
The University of Alicante (Spain)	Electricity and heating consumption, energy efficiency, renewable energy use and generation, energy savings, carbon intensity

The **University of Montpellier** focuses on basic consumption metrics, specifically total electricity and gas consumption. However, data is only available for the year 2019, with no

ongoing monitoring in subsequent years. This limited scope reflects an early stage in energy data management, although reduction targets for 2024 have been set.

In contrast, the **University of Graz** demonstrates a comprehensive and advanced approach. It tracks total electricity and heating consumption, including breakdowns for solar thermal and district heating. The university also monitors energy efficiency per square meter, energy savings in a 3-year comparison, and the share of renewable energy in total consumption. Additionally, it records electricity generation from renewable sources. This level of detail indicates a mature and integrated energy monitoring system.

The **University of Novi Sad** tracks electricity and heating consumption and reports a basic energy efficiency metric. However, it lacks data on renewable energy use, energy savings, and generation, suggesting a more foundational level of monitoring focused primarily on consumption.

Vilnius Gediminas Technical University also maintains a strong monitoring framework. It tracks electricity and heating consumption, energy efficiency, and renewable energy use, with 100% of electricity and over 60% of district heating sourced from renewables. Although electricity generation from renewables is partially monitored, especially in laboratory settings, the university shows a clear commitment to sustainability.

The **University of Palermo** offers a detailed and service-specific breakdown of energy use. It monitors total electricity and gas consumption, electricity used by service type (such as lighting and cooling), and multiple energy efficiency indicators. It also tracks energy savings, the share of renewable energy, and the ratio of installed to potential renewable energy capacity. This level of granularity supports targeted energy management and planning.

The **University of Alicante** has a well-developed energy monitoring system, tracking total electricity and heating consumption, both sourced from 100% renewable suppliers. It monitors energy efficiency for electricity and heating, with real-time data available through the KUUNA platform. Energy savings are also tracked and carbon intensity is calculated using the ECOCAMPUS tool. Electricity generation from renewables is currently limited to specific installations (e.g. Petrology Parking), with broader monitoring expected from September 2025.

In summary, while all universities track basic consumption metrics, only a few, such as Graz, Vilnius, Alicante and Palermo, extend their monitoring to include efficiency, energy savings and the integration of renewable energy. This comparison highlights the varying levels of energy data maturity and the potential for shared learning and standardisation across institutions.

3.2 DATA SOURCES AND MONITORING

The second part of the survey focuses on the data sources and monitoring systems used by each university to track their energy KPIs. It reveals the institutional structures, tools, and update frequencies that support energy data collection and management.

At the **University of Montpellier**, energy data is sourced from utility billing records, with the facilities department responsible for monitoring. However, updates are conducted only on a yearly basis, and the data is limited to a single year, indicating a minimal and infrequent monitoring system.

The **University of Graz** demonstrates a more advanced and structured approach. It uses a combination of utility billing records, internal energy monitoring systems, and specific meters for photovoltaic and solar thermal systems. The Directorate of Resources and Planning oversees the data collection, with responsibilities assigned to the experts of Buildings and Technology. Data is updated either monthly or annually, depending on the KPI. This layered system allows for both high-frequency updates and comprehensive coverage of energy performance.

At the **University of Novi Sad**, data is also primarily collected through utility billing records. The management of individual faculties, along with designated energy managers, is responsible for tracking energy use. Updates are performed annually. While the structure is in place, the scope of monitoring is narrower, focusing mainly on basic consumption metrics.

Vilnius Gediminas Technical University relies on utility billing records as well, with the Facility Management Department overseeing the process. Data is updated annually, and renewable energy data is also sourced from suppliers. The university benefits from a centralised supplier that provides 100% renewable electricity, simplifying the tracking of renewable energy use.

The **University of Palermo** employs both utility billing records and a dedicated monitoring system to track energy consumption and generation. The Facilities Office and energy manager staff are responsible for data collection, with updates occurring annually. The use of a monitoring system allows for more detailed tracking, including service-specific electricity consumption and renewable energy generation.

At the **University of Alicante**, energy data is collected through a combination of utility billing records and advanced digital monitoring tools. The Technical Unit is responsible for electricity and heating consumption data, while the SMART UNIVERSITY team oversees energy savings and renewable energy monitoring via the KUUNA platform. KUUNA enables real-time data tracking at 15-minute intervals, offering detailed insights into consumption patterns. Updates occur monthly through invoices and are also summarised annually. ECOCAMPUS calculations provide carbon intensity data. This integrated approach, supported by cross-departmental collaboration, ensures a high-frequency, reliable monitoring system that covers most campus buildings, with further expansion underway.

In summary, while all universities use utility billing records as a foundational data source, the sophistication of their monitoring systems varies. Universities like Graz, Alicante and Palermo integrate internal monitoring tools and assign clear departmental responsibilities, enabling more frequent and detailed data collection. Others, such as Montpellier and Novi Sad, rely on simpler structures with less frequent updates, which may limit their ability to respond dynamically to energy performance trends.

3.3 DATA AVAILABILITY

The data availability section of the survey highlights significant differences in how comprehensively each university tracks and maintains its energy data. Some institutions, such as the University of Graz, Vilnius Gediminas Technical University and the University of Alicante, have nearly complete data sets for most KPIs, supported by regular updates and integrated monitoring systems. Others, such as the University of Montpellier and the University of Novi Sad, have significant gaps, with data either limited to a single year or missing entirely for key indicators such as renewable energy use and energy savings. In

several cases, data is partially available or based on estimates, particularly for metrics such as energy efficiency and savings that depend on historical baselines or building-specific measurements. These inconsistencies point to the need for more standardised and continuous data collection practices across facilities. A summary of data availability and gaps is presented in Table 4.

Table 4. Summary of data availability and identified gaps in each university

University	Data Availability	Gaps Identified
University of Montpellier (France)	Partial (only 2019 data)	No monitoring for other years
University of Graz (Austria)	Mostly complete	Some building-level efficiency and energy savings data are estimated
University of Novi Sad (Serbia)	Limited	No data on renewable energy or energy savings
Vilnius Gediminas Technical University (Lithuania)	Mostly complete	Partial data on renewable energy generation from labs
University of Palermo (Italy)	Mostly complete	Partial gas consumption data due to past billing practices
The University of Alicante (Spain)	Mostly complete	Data for on-site renewable generation is still being integrated; some external buildings lack detailed breakdowns

In summary, the analysis of data availability across universities reveals a mixed landscape. While some institutions maintain comprehensive and regularly updated data sets, others face significant gaps due to limited monitoring, outdated records, or reliance on estimates. These inconsistencies hinder effective energy management and comparison. Addressing these gaps through standardised data collection and improved monitoring systems is essential to building a reliable foundation for sustainability planning and performance evaluation in higher education.

3.4 UNMONITORED KPIs

During the survey, several unmonitored metrics were identified across the participating campuses, reflecting areas where energy performance tracking is still underdeveloped or absent. The most common unmonitored metrics include carbon intensity, energy intensity, and waste heat recovery. Some campuses also lack data on energy savings, battery storage usage. While a few institutions, such as Graz and Alicante, have started tracking carbon intensity, other indicators like energy intensity and per-user efficiency remain unmonitored across most universities. The reasons for these gaps vary, from a lack of infrastructure and monitoring equipment to the complexity of collecting data across different building types and energy systems. Addressing these unmonitored metrics is critical to achieving a complete and more accurate picture of institutional energy performance.

In summary, common unmonitored KPIs across institutions include:

- Carbon Intensity
- Energy Intensity
- Waste Heat Utilisation
- Battery Storage Usage

It is important to note that all institutions, except the University of Graz, do not monitor Green Commuting Metrics either. Graz does monitor them, but refers to them as the Modal Split.
These KPIs are essential for a holistic understanding of energy performance and environmental impact but require additional infrastructure or data integration.

4. ROADMAP FOR INTEGRATING NATIONAL STRATEGIES INTO INSTITUTIONAL POLICIES

The development of sustainable, energy-conscious university behaviour demands an integrated approach that links national priorities with institutional strategies, operational tools, and measurable outcomes. The overview of the national policy frameworks, institutional energy strategies and actions, stakeholder integration into process management, and the current landscape of monitored KPIs offers a foundation for designing a strategic, actionable roadmap for HEIs.

The proposed roadmap is not a prescriptive checklist but rather a flexible, adaptable pathway, grounded in the practical experiences of six European universities. These institutions, while differing in regulatory context, profile, and infrastructure, share a growing commitment to embed sustainability into their missions, operations, and cultures.

From Policy Alignment to Institutional Action

As demonstrated in the national policy overviews, universities are increasingly being shaped by ambitious national climate and energy frameworks, whether through direct legal obligations or through incentivised engagement with public-sector transformation strategies. Many HEIs now operate within a multi-layered policy ecosystem, where regulatory drivers, national climate goals, and EU-level commitments intersect with institutional plans and identification of larger potential, because of their profile and role peculiarities in the given context.

Institutions have responded by translating national goals into strategic plans. These strategies reveal common rationales: improving energy efficiency, reducing GHG emissions, integrating renewables, and embedding sustainability in academic and operational practices.

The roadmap pillars concern the use of KPIs for monitoring and evaluation. As the survey and national inputs show, while some institutions already operate structured sustainability management systems (e.g., with regular energy audits), others are still in the early stages of KPI systematisation. There is a wide variation in both the availability and granularity of monitored indicators. At present, most institutions monitor core energy KPIs such as electricity and gas consumption, building energy intensity, and renewable energy output. However, less attention is given to qualitative or impact-oriented KPIs, such as behavioural change, awareness, or cross-sector partnerships. Only a few institutions integrate education- and research-related KPIs into their sustainability frameworks, pointing to a need to broaden the scope of institutional monitoring systems.

Given this landscape, the proposed roadmap serves as an approach for institutions seeking to advance their sustainability transitions in alignment with national energy and climate goals. It provides structured phases—Assess, Plan, Implement, Monitor & Evaluate—to guide HEIs and their communities in transforming the goodwill and on-demand commitments into operational strategies, stakeholder-driven processes, and measurable impacts.

By anchoring this roadmap in the practices and experiences of partner institutions, the aim is to facilitate transferability, comparability, and continuous learning across contexts. The roadmap encourages institutions to move beyond compliance and toward leadership (by

adding institution-specific and impact-focused KPIs into a roadmap) in the sustainable transformation of the higher education sector.

To support practical implementation, the roadmap is broken down into four key phases. Each phase includes concrete actions to help institutions align with national goals, develop tailored strategies, engage stakeholders, and monitor performance.

The diagram below illustrates the roadmap structure, and the table that follows explains each step in detail, offering a clear and actionable pathway for implementation.

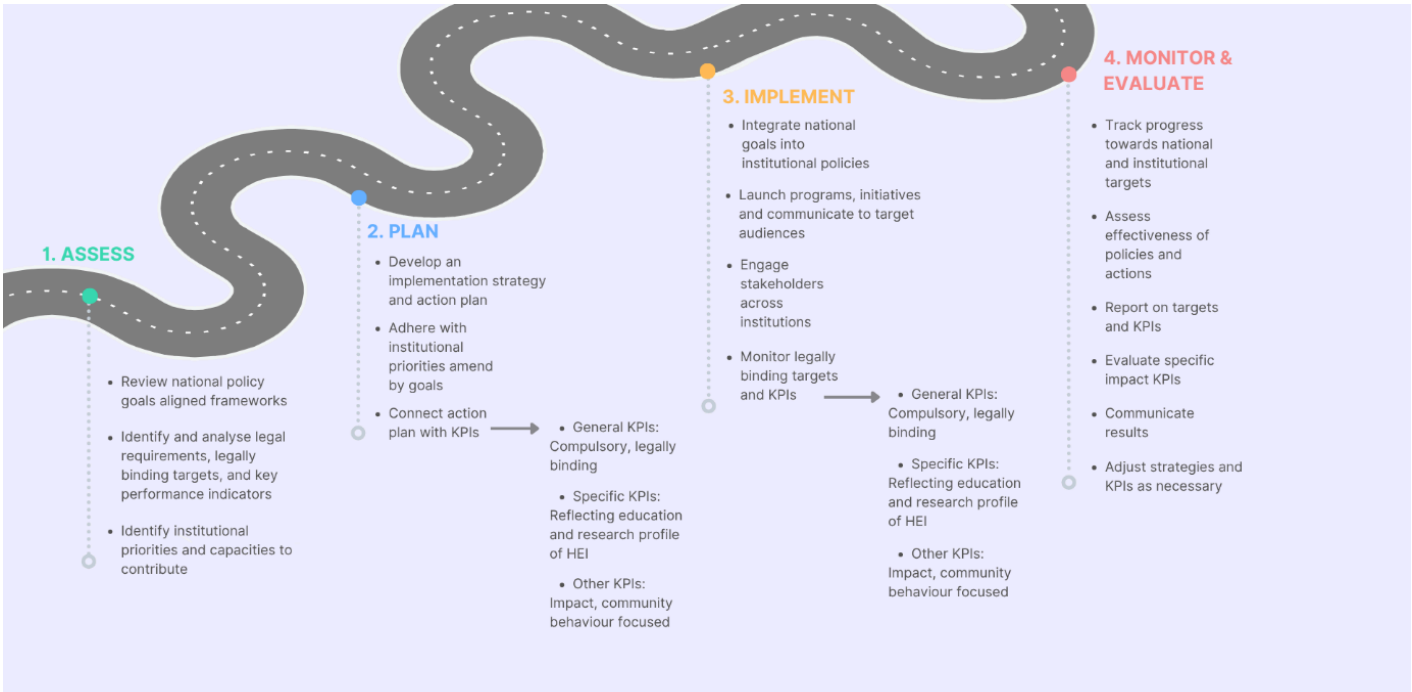

Figure 2. Unified consortium roadmap

Table 5. Explanation of the roadmap phases and associated institutional actions

STEPS	KEY ACTIONS
1. ACCESS	
The goal is to establish the baseline by reviewing the national policy goals and regulatory frameworks relevant to the institution.	- Review national policy goals and aligned regulatory frameworks. *Examine relevant national strategies and legal requirements related to sustainability, energy, or climate action.*
	- Identify legally binding targets and KPIs stemming from national policies. *Determine which performance indicators and targets are mandatory for higher education institutions.*

	- Identify institutional priorities and capacity to contribute. *Assess the institution's strategic objectives, resources, and readiness to support national goals.*
2. PLAN	
The goal is to develop a clear, actionable strategy that translates goals into operational steps.	- Develop institutional strategy for implementation. *Formulate a strategic plan aligned with national sustainability objectives, adapted to institutional context.*
	-Aligned with national priorities and transformed it into a detailed action plan. *Break down the strategy into specific actions, timelines, and responsible units.*
	-Connect the action plan with relevant KPIs *The selected KPIs should reflect both national policy expectations and the institution's own strategic goals.* • *General KPIs: These are compulsory, legally binding indicators set by national or regional authorities. Institutions are required to monitor and report on them.* • *Specific KPIs: Tailored to the education and research profile of the higher education institution (HEI), these reflect its core mission and local priorities.* • *Other KPIs: These focus on broader impacts such as behavioural change, stakeholder engagement, or community-level outcomes, helping institutions capture social and environmental dimensions of sustainability.*
***3.* IMPLEMENT**	
The goal is to integrate the plan into operational activities and institutional policies.	- Integrate national goals into institutional policies. *Embed sustainability goals into official documents, regulations, and operational processes.*
	- Launch programs and initiatives, communicate to target audiences. *Execute planned actions and ensure visibility through internal and external communication.*
	- Engage stakeholders across institutions. *Involve various departments, staff, and students to ensure shared responsibility and ownership.*

	- Monitor legally binding targets and KPIs *Monitoring supports compliance with national regulations and helps evaluate institutional performance in real time.* ● *General KPIs: These are compulsory and legally binding. Institutions must report on them to comply with national or regional policy requirements.* ● *Specific KPIs: Reflecting the institution's educational and research focus, these KPIs allow monitoring of goals tailored to the HEI's mission and local context.* ● *Other KPIs: These track broader impacts, such as community engagement and behavioural change, helping to assess social dimensions of sustainability performance.*
4. MONITOR & EVALUATE	
The goal is to track progress, assess performance, and adapt strategies.	- Monitor progress towards both national and institutional targets. *Regularly collect and analyse data to measure advancement toward set objectives.*
	- Evaluate the effectiveness of policies, programs, and actions. *Assess whether implemented measures are producing desired results.*
	- Report on legally binding targets and KPIs. *Communicate outcomes to authorities and internal stakeholders.*
	- Assess specific impact KPIs and collect feedback from stakeholders. *Use stakeholder input to understand qualitative impacts and refine indicators.*
	- Communicate results and adjust strategies or action plans as required. *Share findings transparently and update plans to respond to challenges and lessons learned.*
	- Adjust strategies, and develop an action plan as necessary. *Based on evaluation findings, refine institutional strategies and update the action plan to ensure continued relevance and effectiveness.*

CONCLUDING REMARKS AND RECOMMENDATIONS

1. An analysis of six national contexts reveals a diverse yet convergent landscape in which HEIs are increasingly aligning with national and European energy and sustainability strategies. While all countries share the overarching goals of the European Green Deal and Agenda 2030, their approaches and enforcement mechanisms vary significantly — from binding legal frameworks in countries such as Austria and France, which directly shape university action, to more voluntary and incentive-based models in countries such as Lithuania, Italy and Serbia.

Despite this variation, all of the HEIs examined are engaging with national priorities, either by complying with formal obligations or by making voluntary commitments and launching initiatives. The study reveals three prevailing models of institutional response: full legal alignment, partial regulatory engagement, and voluntary adoption. These models correspond to national expectations, legal structures, and funding mechanisms, but also to the universities' own mission-driven leadership and their perceived role in accelerating the green transition.

The interplay between national imperatives and institutional strategies is therefore not merely a top-down compliance mechanism, but rather a dynamic process of mutual reinforcement. Universities act as both implementers of national climate objectives and autonomous agents capable of innovation, policy interpretation, and sustainability leadership.

This comparative overview provides a solid foundation for designing a common roadmap for HEIs. Even in the absence of uniform legislation, it illustrates that shared goals, proactive institutional strategies and stakeholder engagement can enable higher education to contribute meaningfully to national and European sustainability transitions.

Analysis of the institutional strategies and practices of the six participating HEIs reveals a shared commitment to advancing sustainability and energy efficiency. However, the depth and formalisation of these efforts vary depending on national regulatory contexts and internal governance capacities. Despite differences in size, infrastructure and energy profiles, all universities have taken strategic steps to align with national and European sustainability agendas.

Many institutions have developed detailed energy and sustainability frameworks, including action plans, KPIs and dedicated sustainability units or centres. While some universities (the University of Graz and the University of Montpellier) operate under binding national mandates, others (the University of Palermo and VILNIUS TECH) rely on voluntary commitments and institutional autonomy. Renewables, building retrofits, and digital energy monitoring emerge as key priorities across the cases.

A structured survey of institutional roles and engagement patterns highlights a consistent trend: staff engagement is stronger than student involvement in almost all phases of strategy development and implementation. While staff play a central role in strategic planning, KPI setting and resource management, students are more involved in community engagement and communication activities. Notably, countries such as Austria, France, Lithuania and Serbia demonstrate relatively higher levels of student engagement, particularly in the outreach and implementation phases.

These findings emphasise the importance of integrating student perspectives into the initial stages of policy and strategy design to foster a more inclusive governance model and strengthen behavioural change and institutional ownership. Enhancing the participation of both staff and students in energy-saving measures is essential for building resilient and accountable sustainability cultures in HEIs.

2. A comparative overview of partner universities' good practices and main challenges reveals that achieving effective energy sustainability in HEIs requires a combination of strategic leadership, technological innovation and stakeholder engagement. Universities such as Graz and Montpellier exemplify the importance of institution-wide governance frameworks that integrate carbon management and energy efficiency into their operational and academic missions. Palermo and Alicante are notable for their advanced energy monitoring systems, photovoltaic installations and carbon footprint tracking, which are supported by robust cross-departmental collaboration. Meanwhile, VILNIUS TECH and Novi Sad showcase the potential of student engagement, behavioural change campaigns and regional green infrastructure projects in fostering cultural shifts towards sustainability.

Despite their diverse local contexts, all of these institutions face shared challenges, particularly financial constraints and outdated infrastructure, which limit the pace and scale of change. These findings emphasise the importance of long-term investment strategies, formal sustainability roles and integrating sustainability into curricula and institutional identity. Together, these examples offer a transferable roadmap for HEIs striving to reduce their environmental impact and lead the transition towards climate-neutral campuses.

3. The comparative analysis highlights the strengths and gaps in energy KPI tracking across the participating universities. The University of Graz and Vilnius Gediminas Technical University are leading in terms of comprehensive data availability and monitoring systems, closely followed by the University of Alicante, which demonstrates a high-frequency, digital monitoring infrastructure with near-complete data coverage. Meanwhile, the University of Montpellier, the University of Novi Sad, and the University of Palermo need to address significant gaps to improve their sustainability performance. This analysis provides a clear picture of where improvements can be made and serves as a valuable tool for guiding future efforts in energy management and sustainability.

Across all universities, utility billing records serve as a primary data source for monitoring electricity and heating consumption. Internal monitoring systems are also utilised, particularly by the University of Graz, the University of Alicante and Vilnius Gediminas Technical University, to provide detailed tracking and analysis. The responsible departments for data collection and monitoring vary, with facilities departments, directorates of resources and planning, and management of faculties playing key roles. Data is generally updated annually, although some universities, like the University of Graz, and Alicante update specific metrics monthly or even more frequently using digital platforms.

In terms of unmonitored KPIs, there are several areas where improvements can be made. For example, carbon intensity and energy intensity are critical metrics that need to be monitored by the University of Montpellier and the University of Novi Sad. Vilnius Gediminas Technical University faces challenges in monitoring energy intensity due to the complexity of

its infrastructure, while the University of Palermo needs to start tracking solar energy utilisation and waste heat utilisation. At the University of Alicante, carbon intensity is already tracked, but energy intensity and user-based efficiency indicators are not yet implemented. These have been identified as future development areas.

To strengthen energy performance monitoring and sustainability planning in HEIs, several detailed recommendations can be drawn from the analysis of current practices and data gaps.

- First, it is essential to establish standardised definitions and methodologies for energy KPIs. Currently, institutions use different metrics and formats, making comparison and benchmarking difficult. A unified framework should clearly define each KPI, such as how to calculate energy intensity or carbon emissions, and ensure consistency in units, reporting periods, and data granularity. This would allow institutions to align their reporting with national and international sustainability standards and facilitate collaborative research and policy development.
- Second, improving data collection infrastructure is critical. Many institutions rely solely on utility billing records, which are often infrequently updated and lack the detail needed for real-time analysis. Investing in smart metering technologies and integrated energy monitoring systems would allow for more frequent, accurate, and granular data collection. These systems should be able to collect data at the building or even room level, allowing for targeted energy efficiency measures and a better understanding of usage patterns.
- Third, filling existing data gaps must be a priority. Several campuses have incomplete records for key years or lack historical baselines, limiting their ability to track progress or evaluate the impact of energy-saving measures. Institutions should conduct audits to identify missing data and implement strategies to recover or estimate historical values where possible. Establishing protocols for regular data validation and archiving will also help maintain long-term data integrity.
- Fourth, the scope of monitored KPIs should be expanded to include critical but currently untracked indicators. These include carbon intensity, energy intensity, waste heat recovery, and emissions from commuting or remote work. Monitoring these KPIs requires working with external energy providers, installing new sensors, and in some cases developing new data models. However, their inclusion is essential for a comprehensive understanding of environmental impact and for achieving broader climate goals.
- To effectively expand the scope of energy metrics, universities need to move beyond technical upgrades and foster cross-departmental collaboration. Monitoring metrics such as carbon intensity, energy intensity, and commuter emissions requires input from a variety of units, such as sustainability offices, academic departments, human resources, and transportation planning. By forming cross-departmental teams, institutions can share responsibilities, align data collection efforts, and ensure that new metrics are both meaningful and manageable. This collaborative approach strengthens data quality and supports a more integrated and strategic approach to sustainability.

4. The proposed roadmap provides a strategic and flexible framework for aligning institutional sustainability initiatives with national and EU-level energy and climate objectives. Based on

the practices and insights of six European HEIs, it reflects diversity in institutional contexts and shared aspirations for sustainable transformation.

By structuring the roadmap into four phases — Assess, Plan, Implement and Monitor & Evaluate — the framework enables HEIs to go beyond mere compliance and transform national objectives into context-sensitive strategies and measurable outcomes. There is a particular focus on developing and using KPIs, especially integrating specific, impact-oriented indicators that reflect the institution's mission and capacity for sustainability leadership.

Crucially, the roadmap emphasises the importance of inclusive stakeholder engagement, capacity building and iterative learning. Through flexible implementation, it encourages institutions to strengthen internal coordination, increase the visibility of their sustainability efforts and foster a culture of accountability and innovation.

Ultimately, this roadmap enables HEIs to play a proactive role in national sustainability transitions, establishing them as key drivers of systemic change through evidence-based policy alignment and institutional action.

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