



SDG 7: Affordable and clean energy

REPORT

University: University of Pécs (UP)

Country: Hungary

Energy management in the spirit of sustainability

The National Energy and Climate Plan and the **National Energy Strategy** give priority to decarbonization targets. In order for Hungary to become a winner in the "green economy", it is necessary to create a knowledge base and competence centre that will enable domestic economic actors to be competitive in the field of various decarbonisation technologies. A new national laboratory will bring together and stimulate domestic research and development in the field of renewable energies. The University of Pécs has launched a project with nine consortium partners. This is the **National Laboratory for Renewable Energy**, which, under the leadership of the University of Pécs, is the third priority national-level organization contributing to Hungary's development after the National Laboratory on Human Reproduction and National Laboratory of Virology. The "National Laboratory for Renewable Energy" project is being implemented under the Széchenyi Plan Plus program, with two main thematic areas: hydrogen technologies and carbon dioxide recovery. The National Laboratory for Renewable Energy will lay the scientific, technological, legal, economic and industrial foundations for low-carbon energy technologies, in particular H₂ production, transport, storage, use and CO₂ recovery. The two technology clusters can play a significant role in sector integration, strengthening domestic security of supply and achieving decarbonization targets, working in parallel and complementing each other.

The strategy for **the Hydrogen Centre**, a new, independent organisational unit created through the Laboratory tender, has been developed. The definition of the main development directions and specific objectives has made it possible to direct the work of the research groups towards common goals with new momentum and in an organised manner. When developing the strategy, the UP paid particular attention to defining R&D&I activities that are relevant to industrial needs, practical in nature and support service competence through research and development. Taking into account the specific characteristics of hydrogen technologies and domestic conditions, and exploiting the university's competencies, two main strategic directions emerged.

The first strategic direction is the "infrastructure technology development" competence, which includes all projects aimed at the technical and economic modelling, design and integration of hydrogen technology infrastructure into the entire value chain, whether for system balancing or mobility purposes. The second strategic direction is "energy container" product development, which begins with prototype production and aims to develop a scalable, modular hydrogen energy storage system at the product level. The work of the Hydrogen Centre is carried out at three faculties (Faculty of Business and Economics, Faculty of Engineering and Information Technology, Faculty of Sciences) and within several research groups.

Key areas of development:

- Infrastructure technology development, such as technical and economic modeling of hydrogen systems required for mobility and grid balancing applications;
- Development of energy storage products, with the aim of creating a modular, scalable hydrogen storage and energy conversion solution;



- As a result of collaboration between different departments, a unique, multi-layer modeling software has been created in MATLAB for system simulations, including hydrogen demand forecasting, resilience modeling, and value chain optimization;
- Announcement of services such as the Energy Container and carbon-negative wastewater treatment plants integrated with green hydrogen production, which demonstrate scalable applications for hydrogen and the potential for CO₂ recovery;
- IoT-based infrastructure monitoring systems, currently under public procurement, designed to support the monitoring of future hydrogen infrastructure.

From an educational perspective, the Faculty of Engineering and Information Technology has launched the third year of the fuel cell and hydrogen engineering postgraduate training program and introduced the elective course "Hydrogen-based Technologies," which 29 students enrolled in for the spring semester of 2024. These initiatives aim to build national expertise in hydrogen technologies and promote interdisciplinary collaboration.

1. Energy saving infrastructure investments

In 2024, the University of Pécs operated and maintained more than 600 thousand m² of real estate, including the integrated city hospitals. In general, it can be said that even in smaller-scale real estate developments, those developments that result in energy savings and are sustainable have been given priority - for years (e.g. lighting modernization, regulatory systems, building surveillance, heating modernization...etc.)

The UP always plans new infrastructure investment projects with technical preparation from a green perspective (e.g. design of supply systems utilizing at least 25% renewable energy, utilization of solar energy...etc.).

In 2024, the largest-volume energy modernization was implemented in the following two buildings:

- II. Internal Medicine Clinic (window replacement, building insulation, heating system modernization...)
- SZBKI Szentmiklós dűlő main building (window replacement, building insulation...)

As a preparation for the KEHOP projects, the energy modernization of 16 of our buildings was done.

2. Energy saving measures

2.1. University policy on energy saving

The University of Pécs is constantly working to implement **energy-saving measures** in the short, medium and long term. During the measures, the UP constantly keeps in mind that educational, research and medical activities are not affected. The measures include the use of heating and cooling systems, as well as measures introduced regarding mandatory holidays associated with the closure of buildings.

2.2. Reduction of annual electricity consumption

The UP has taken several measures to reduce annual electricity consumption, despite the increasing demand. In the case of electrical equipment, the purchasing directorate gives priority to the purchase of devices with the highest possible rating (A, B). On the operational side, monitoring studies regarding energy consumption continued. In 2024, the installation of solar panels was completed on several buildings and production of the systems began.

2.3. Increasing the proportion of energy-saving devices (e.g. LED)



The modernization of lighting is a priority. In 2024, thousands of outdated light sources were replaced with high-efficiency LED solutions, contributing to a reduction in energy consumption while still meeting brightness and safety requirements.

The UP has also begun replacing outdoor lighting with sensor-controlled systems that respond to dusk in order to further minimise unnecessary energy consumption. To further support energy efficiency, it has introduced shading systems to reduce natural heat gain, thereby minimizing the need for air conditioning and reducing the ecological footprint of its buildings.

2.4. Building management system expansion

The energy efficiency potential of the university's campuses and buildings is continuously assessed. The aim is to prioritise sustainability considerations in order to optimise energy consumption. Building management systems ensure the continuous monitoring of heat and electricity consumption in a number of buildings. The modernisation and standardization of these systems has begun and will continue in the coming years.

The building management systems of the UP are currently being mapped with the involvement of an external consultant. The UP's medium-term goal is to make all surveillance systems visible and controllable from the dispatch center.

2.5. Elements of green building implementation

The architectural design of the university buildings also incorporates key elements of green architecture. The layout of the spaces allows for natural ventilation, reducing the need for artificial cooling and ventilation systems. Large glass surfaces and carefully designed structures make maximum use of natural sunlight, which not only reduces the need for artificial lighting but also improves the comfort and well-being of those using the rooms. Several buildings have green roofs, which serve as effective thermal insulation, reduce heat absorption and help manage rainwater, while also offering environmental and aesthetic benefits.

2.6. Some concrete example for energy awareness programs at the UP

Date	Activity	Report
15.02.2024	Paper briquettes , organized by the University of Pécs, Hungary	Students at Babits Mihály High School in Pécs created eco-friendly paper briquettes from waste materials, providing heating for a disadvantaged family. The project combines recycling, social responsibility, and student community service, supported by local partners and the Green University program. It reduces waste while fostering environmental awareness among students.
06.03.2024	Act today for tomorrow – International World Energy Saving Day , organized by the University of Pécs, Hungary	Around the world on 6th March, actions are being organized to save energy. It is a day that encourages us to act as individuals for the benefit of the community, drawing attention to the fact that with a little attention we can save a lot of energy and therefore money in our households. The sum of our individual savings, on a "many little ones make a difference" basis, will ultimately have a positive impact on the world's energy resources. The world's population continues to grow while the amount of



		resources per capita is decreasing. This is why environmental awareness, energy saving and the use of renewable energy sources are of paramount importance. The individual steps we can take to protect our environment and to combat energy and resource waste extend to all areas, from where we live to where we work.
20-21.03.2024	Simonyi Hackathon , organized by the University of Pécs	Sustainable energy sources and hydrogen technology were the focus of the Simonyi Hackathon, an idea competition for students organized by the Simonyi Center for Business and Economic Development. The 21 participating teams had to develop an educational campaign and concept for the use of alternative energy sources. The 21 participating teams were tasked with developing an educational campaign and concept for the use of alternative energy sources. Corporate partners also took part in the event, supporting the teams as experts. Students from all faculties of the UP participated in the competition.

There are daily green tips on sustainability issues on the UP Green University Program website, Facebook, and Instagram pages.