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Press release

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EU project "META BUILD": Using digital twins to electrify university buildings

A team headed by computer scientist Professor Herrmann de Meer will be participating in the EU Horizon project "META BUILD": Using buildings on the University of Passau campus, computer scientists will be testing ways to reduce the carbon emissions of academic institutions.

The building sector has failed to meet the climate targets year after year. It accounts for 40 percent of energy consumption and 36 percent of greenhouse gas emissions in the European Union. The EU project "META BUILD" – an acronym for "Powering the METAmorphosis of BUILDings towards a decarbonised and sustainable energy system" – is scheduled to start on 1 January 2024 and will address this impasse. Bringing together 38 partners from 13 countries, the research cluster has set its sight on transforming the building sector from a polluter into an industry with an energy-efficient future in the next four years.

A team from the University of Passau will also be taking part under the supervision of Professor Hermann de Meer, who holds the Chair of Computer Networks and Computer Communications. They will be looking for ways to electrify existing buildings based on renewable energy sources using the university campus in Passau as an initial example and exploring sector coupling approaches for identifying new flexibility sources. The computer scientists have also been tasked to provide a solution that can serve as a template for other academic institutions.

Electrification in this context means substituting fossil fuels with green power in order to minimise the CO_2 emitted by the buildings. "The energy transition requires one thing above all else: flexibility," underscores Professor de Meer. He explains that flexibility is needed both in terms of energy supply and in terms of consumption: "Electrical and thermal storage systems can be employed to ensure a flexible power supply while consumption can be controlled by introducing variable tariffs – for charging electric cars, for example – and by fostering awareness among users".

Developing enhanced digital twins of the university buildings

To find ways of optimising these factors, the computer scientists have begun to develop enhanced digital twins of university buildings. This involves equipping the relevant buildings with sensors that measure consumption history, local power generation, waste heat, and the levels of stored thermal and electrical energy. External information, such as weather data, are added to enhance the digital twin, and AI techniques are used to analyse the collected data.

In addition to the digital twin, the project will also be implementing various interfaces to inform users of the building about the availability of renewable energy and the energy status. The goal is to create an awareness for flexible energy use. "Instead of a purely technical approach, we're adopting a holistic approach," explains Professor de Meer. This is because the measures will be successful only if all the people affected agree to accept and implement them.

A sustainable campus when sustainability was hardly on anyone’s agenda

Given that the University of Passau has set itself the goal of spearheading the transition as a sustainable academic institution, Professor de Meer believes that the university is particularly suited for the project. Although the idea had not been so much of a focus at the time, the campus was already a pioneer project for sustainability when it was founded in 1978. Making the most of the picturesque site on the River Inn, the architects created a system that uses water from the mountain river to cool the server and computer systems in the IT centre. The university is now forging ahead with the topic in a number of different projects. For the purpose of bundling these activities, the University Executive has set up a sustainability hub that will also play a crucial role in the EU project: "I'm delighted with the new project," says Professor Werner Gamerith, Commissioner for Transfer and Internal Integration with the Cross-Functional Task of Sustainability. "We have been given the exciting task of developing recommendations for action based on the academic work performed by the researchers, discussing these with the practitioners, and implementing them."

The European Union has awarded the project EUR 12.5 million in funds under the Horizon Europe programme for research and innovation. Out of this pot, 321,875 euros are earmarked for the University of Passau.

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Drone image of the University of Passau campus
University of Passau
University of Passau

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