Could the Velke Popovice brewery also become a handmade paper factory? Could we measure traffic density based on noise assessment? Is the use of HEXECO modules an innovation in the construction industry? Students from the Czech Technical University in Prague have presented their visions.

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The local final of the project oriented EuroTeQ Collider 3 competition took place at Faculty of Electrical Engineering of Czech Technical University in Prague (FEL) on 3 April 2023. In this competition, 50 students, organized in 12 interfaculty teams, had the opportunity to choose solutions to 10 topics submitted by domestic companies. The overarching theme for the competition was "Leave no Waste Behind," with the sub-categories of cities, energy, and consumption.

The jury, consisting of experts from the CTU together with company representatives of GasNet, Plzeňský Prazdroj, DEK, JRD, and CITYA.io, selected the three best student solutions from all submitted projects.

The first award-winning project was commissioned by Plzeňský Prazdroj and Asahi, with the challenge dealing with the processing of paper waste from beer labels. The jury was most impressed by the presentations of the following students: Andrea Jeřábková (from Faculty of Information Technology, FIT), Gabriela Blažková and Sandra Halmlová (both students of Faculty of Architecture, FA). Their proposal offers the creation of a so-called Kozlov paper mill producing recycled paper and beer coasters in the brewery space. Along with this proposal, the students also presented a visitor centre with workshop space for visitors to craft handmade paper and coasters. Andrea Jeřábková, the leader of the competition team, commented on this rendition of the theme: "*Making coasters was an obvious solution for us from the beginning, but we wanted to take our proposal a little further. So, we came up with a proposal for public workshops that could raise the popularity of the Popovice brewery and at the same time fit perfectly with the current image of Kozel as a 'folk' brand. We even conducted a test workshop, which confirmed our hypothesis that such a centre has great potential.*"

The company's representative Tomáš Dupal also gave his opinion on the possible establishment of the Kozlov paper mill: "*The team came up with an interesting solution for the use of waste, but also brought ideas for its upcycling. We like the combination of*

sustainability with other fun elements and opportunities for tourism and opening to the public. We could imagine implementing a similar workshop on a smaller scale."

The jury was also very impressed by the team consisting of Šimon Kochánek from the Faculty of Biomedical Engineering (FBMI), Pavel Svoboda (FA) and Richard Šedivý (FIT), who, as part of the CITYA start-up assignment, dealt with measuring traffic intensity in suburban regions. The measured data could then be used to develop shared passenger transport. "*We were looking for a simple and inexpensive solution that is particularly adapted to measuring vehicle flow outside cities. In the end, we came up with a concept that uses a smart sensor with two microphones to classify the type and direction of travel of the vehicle using a neural network. We can then collect and merge these data into a model that can analyze the mobility requirements of the population in real time, which can then be used to further develop alternative, green mobility.*"

JRD received a proposal for the development of regenerative technologies in the construction industry. Here, the experts were interested in the HEXECO solution presented by students Josef Kovařík from the Faculty of Mechanical Engineering (FS), Jiří Budil from the Faculty of Electrical Engineering (FEL), Cristina Perulero Cabrera (FIT) and Teresa Jeřábková from the Faculty of Nuclear Sciences and Physical Engineering (FJFI). "*In our proposal, we sought to optimize housing units and address the current problems of urban areas, especially the high energy demands of buildings, air pollution, overheating in the summer months, and drought. We came up with the concept of hexagon-shaped living cells to reduce the wall area and consequently reduce heat loss. We try to keep the technical solutions low-cost and low energy. For cooling, a combination of adiabatic heat exchanger, WAHX concept, or radiant heat emitters was used. We also designed special slatted equipment for solar energy management. Since even a smart building with a "dumb occupant" can be far less energy efficient than a conventional building, we supplemented the whole proposal with a mobile app that motivates the occupants to be more efficient and informs them about their energy consumption,*" said Josef Kovařík, a representative of the working group.

All the above projects will go forward to the EuroteQaThon international competition, which will take place on 10-12 June in Prague. Teams from all EuroTeQ partner universities - Technical University of Munich, Technical University of Denmark, Technical University of Eindhoven, École Polytechnique, Tallinn University of Technology, CTU in Prague, École Polytechnique Féderale de Lausanne and Technion Israel Institute of Technology - will compete in this competition.

A presentation of all the challenges that CTU students could solve in the current round of EuroTeQ Collider is available on web.