



Eastern and Central Europe Roadshow



Hydrogen fuel cell bus will carry passengers on line 17 in Most for three days

In just three days, it will drive six hundred kilometres through the streets of Most in a test run; it will be deployed on a demanding route with several elevation changes, it has only water vapour coming out of its exhaust, and it is powered by an unconventional fuel - hydrogen! This is the unique CaetanoBus, designed in cooperation with Toyota and expected to provide Most with accurate data on whether hydrogen is a promising future fuel for public transport vehicles.

The testing of the bus will take place in Most thanks to the involvement of the Czech Hydrogen Technology Platform (HYTEP) in the pan-European JIVE 2 project, which aims to bring up to 310 environmentally friendly, emission-free hydrogen buses to the streets of European cities. The hydrogen bus was presented to the professional public on 5 December and will be in regular operation on line 17 from 6 to 8 December.

The European JIVE 2 project, in which the testing will take place, aims to help local authorities decide on purchasing hydrogen buses. "The hydrogen economy needs to be kick-started as quickly as possible. With our support, the JIVE project is succeeding in spreading hydrogen fuel cell buses across Europe, meaningfully reducing the cost of the entire downstream value chain of hydrogen technology, including raising awareness of how it works," explains Bart Biebuyck, Executive Director of the Clean Hydrogen Partnership.

"Thanks to the project, the cities of Most and later Ostrava will be provided with a unique emission-free, environmentally friendly hydrogen-powered bus to test on public lines," notes Aleš Doucek, chairman of the Czech Hydrogen Technology Platform (HYTEP), which is responsible for the testing.

"Most was chosen for the hydrogen bus testing based on the recommendation of the Economic and Social Chamber of the Ústí nad Labem Region, which is helping us to organise the event in the city. Furthermore, the bridge has shown interest in testing the bus in real conditions, and I am pleased that the general public will also be able to test the bus," Doucek adds, noting that Toyota's CaetanoBus hydrogen bus was already tested in Slovenia and Croatia in November and will head to Slovakia and Hungary in 2023.

Ústí nad Labem Region is betting on hydrogen, solar power plants, and electrolyzers will be built here

It is no coincidence that the hydrogen bus will start testing in Most. Historically burdened with intensive coal mining or chemical industry, the region wants to be a Czech leader in hydrogen technology. This is evidenced by the Ústí nad Labem region being the first region in the Czech Republic to develop its own hydrogen strategy this spring.

"The Ústí nad Labem Region is on the threshold of a completely new era when it has to transform itself, abandon outdated types of industry and focus on the future, new challenges, innovative methods, technologies and energy sources. Hydrogen is a logical solution for our



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region, given the rich representation of the chemical industry, which is a source of hydrogen. Therefore, we want to focus on this energy source to build an economy where hydrogen is produced, distributed and used by end-users in our region, for example, in transport. We certainly have the potential to be a leader and a driving force in hydrogen," says Jan Schiller, Governor of the Ústí nad Labem Region.

The development of hydrogen technology in the Ústí nad Labem region is already showing promising steps. "The CaetanoBus hydrogen bus roadshow in Most is one of the pilot projects aimed at promoting the introduction of hydrogen technology into practice in the Ústí nad Labem region. This is also our goal on behalf of FOR H2ENERGY, which is why we are financing the hydrogen bus in Most and supporting the entire roadshow. In addition, we will soon build a local hydrogen farm in the Ústí nad Labem region and build photovoltaic power plants and an electrolyser to produce green hydrogen in the Triangle Strategic Industrial Zone near Žatec. Construction is scheduled to begin in 2024, and we want to start trial operations at the end of 2025. " We are starting to run on hydrogen," says Tomáš Krenc, managing director of FOR H2ENERGY

According to Jan Schiller, the governor of the Ústí nad Labem Region, hydrogen mobility has a future. Still, energy sources must be chosen carefully and with a view to long-term and sustainable use, given the considerable upfront investment.

"With the available infrastructure of refuelling stations, I can imagine excellent use of hydrogen buses in urban transport, but I would rather rely on electricity for trains. I am happy to see the hydrogen bus being tested in our country in live operation. It is these tests that will tell us more about future use. For passengers, the comfort of the journey should be improved, for example, in terms of noise reduction. However, the biggest benefit for passengers and other city residents will be cleaner operation with minimal emissions and air pollution. This is especially welcome now in the winter months," said Schiller.

Hard data will help make decisions about future public transport vehicles

One of the main goals of the three-day hydrogen bus testing in Most is to get objective data on how the vehicle behaves in real traffic. In particular, the data that will be collected includes fuel consumption, road profile, fuel cell performance over time, battery charging and discharging, cabin thermal comfort and overall vehicle capability in the classic terrain of Most.

"The transport company of the cities of Most and Litvínov will test the hydrogen-powered bus in real operation on one of the busiest public transport lines - line 17. According to him, Most has already commissioned an analysis regarding the possibility of replacing the existing diesel buses with alternative propulsion, i.e. electric or hydrogen buses. "By operating a hydrogen bus for three days, the transport company will verify the operational data presented in this analysis and also the suitability of operating a hydrogen bus on public transport lines in Most and Litvínov," adds Mayor Paparega.



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"Testing the hydrogen bus in real operation will provide important information for the city of Most itself and other cities in the region, to which we will jointly provide access to this data. We believe this represents a significant step towards fully integrating emission-free hydrogen-powered buses into public transport in our region. We see it as equally important that citizens will be able to experience the operation of the bus. The Economic and Social Council of the Ústí nad Labem Region, in its position as coordinator of the Hydrogen Platform of the Ústí nad Labem Region, will continue to support activities aimed at the use of hydrogen in the Ústí nad Labem Region as a clean, emission-free fuel, but also as a medium that can facilitate the transition to green energy," notes Gabriela Nekolová, Chairwoman of the Economic and Social Council of the Ústí nad Labem Region.

In a small power plant, water vapour comes out of the exhaust instead of an engine

The hydrogen bus CaetanoBus is powered by fuel cells. "In the engine area, there is a fuel cell, simply a small mobile power plant, which combines hydrogen from the tank with air from the surroundings. This chemical reaction produces electricity to power the vehicle. The bus also has a small battery installed to match the fuel cell's power for immediate power needs. This is a hybrid between a hydrogen and a battery vehicle," says Jan Sochor, an analyst at the Czech Hydrogen Technology Platform (HYTEP), describing the principle of the bus's propulsion system. The hydrogen bus is just as safe as its diesel equivalent. The hydrogen tanks are located on the vehicle's roof, and the bus is emission-free and emits only water vapour.

The hydrogen refuelling of the bus will be provided by project partner Messer Technogas using a mobile filling station. The company is the world's largest family-owned company in producing and supplying industrial gases. "We are delighted that, based on our experience in providing hydrogen supply in all Central and Eastern European countries, we have been selected as a JIVE 2 partner and will be providing hydrogen supply and bus filling for this project in the Czech Republic and at other JIVE 2 stops," says Vít Tuček, Head of Hydrogen Technology Development at Messer Technogas.

The standard range of the CaetanoBus is over 350 km, using 350 bar filling technology. "In the tests, filling to only 200 bar will be used, meaning that 21 kg of hydrogen will be stored in the tanks. The manufacturer says the average consumption of its bus is around 6 kilograms per 100 kilometres. We are curious to see whether testing will disprove or confirm this figure. It is even more interesting that the bus will be tested in winter when consumption is usually slightly higher due to heating. Yet, the hydrogen should not suffer from a significant increase in consumption. Our testing has yet to confirm this," concludes Jan Sochor, an analyst at the Czech Hydrogen Technology Platform (HYTEP).

About the JIVE and JIVE2

The JIVE and JIVE2 projects have received funding from the Clean Hydrogen Joint Undertaking under Grant Agreements No 735582 and 779563. This Joint Undertaking receives support from the European Union's Horizon 2020 research and innovation programme, Hydrogen Europe, and Hydrogen Europe Research.

The JIVE and JIVE2 projects, which started in January 2017 and January 2018, will deploy 310 zero-emission fuel cell buses and associated infrastructure (under the MEHRLIN project) in 17 European cities and regions by the early 2020s – the largest deployment in Europe to date. The buses will be deployed in cities and regions in France, Germany, Italy, the Netherlands, Spain, and the United Kingdom.



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