



FEBUS, a success story of fuel cell buses deployment

Pau, France

IN A NUTSHELL

In line with its climate action and mobility policies, in 2017 the City of Pau decided to invest in a zero-emission fleet composed of eight 18m-long fuel cell-powered buses (a world first) and hydrogen refuelling infrastructure.

A territory with positive energy for green growth

Pau has developed several innovative solutions in the past few years to decarbonise sectors such as mobility and heat production. One of the best examples is the launch of the first hydrogen-powered 18 metre bus fleet in France. These 8 vehicles, known as FÉBUS buses, connect the city's main points of activity situated between the hospital and the railway station, such as the university campus and administrative, commercial and leisure hubs. The city has created dedicated bus lanes along 85% of the 11 km bus route to ensure a high-quality, reliable service. Thanks to the creation of this "Bus Rapid Transit" route, people can now travel across the city in 17 minutes.

FÉBUS buses use fuel cells for primary power and lithium batteries for additional power when needed. The buses have onboard fuel cell power modules and generate electricity through an electrochemical reaction – the reverse of electrolysis. The only substances emitted are water and heat. The electricity generated by the fuel cells feeds the hybrid electric engines and charges the energy storage system. Regenerative braking on the buses increases the fuel economy, and the high-pressure tanks on the roof of each bus store hydrogen fuel to ensure a full day of operation.

Underlying policy framework

In 2015, Pau conducted studies on environmental issues in collaboration with public, private and third sector organisations, which led to the development of a Climate Action Plan for the intercommunal area. The studies allowed Pau to create a comprehensive analysis of several key issues such as air quality, energy networks, the potential for carbon sequestration and the vulnerability of the territory due to climate change. The council approved the Climate Action Plan in June 2018 and set out the territory's objectives for mitigating climate change and adapting the city over the next five years. Pau committed to developing a low-carbon territory and providing better quality of life for residents. The goals included a 27% reduction in greenhouse gas emissions,



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COMMUNAUTÉ
D'AGGLOMÉRATION PAU
BÉARN PYRÉNÉES



Ville de Pau ©Ville de Pau

Population: 162,000	Area: 343.60 km ²
Signatory to the Covenant of Mayors since: 2019	Overall CO₂ emissions reduction target: 55% carbon neutrality by 2040



FINANCING THE PROJECT

- + **Europe's FCH-JU program (3Emotion and JIVE2 project):** €4.5m
- + **FEDER:** €3.5m
- + **ADEME:** €1.8m
- + **Région Nouvelle Aquitaine:** €0.9m

20% energy savings, doubling renewables production and a 10% reduction in air pollution by 2030.

To achieve these milestones, Pau Béarn Pyrénées Urban Community launched FÉBUS. Developed by Pau Béarn Pyrénées Mobilités (PBPM), this project not only boosted the implementation of the Pau Climate Action Plan, it also aligned with the national goals of decarbonisation and development of zero-emission transport solutions. In fact, it was included in the National Hydrogen Deployment Plan commissioned by the Ministry of Ecological Transition.

Actors involved

Several actors were involved in the development and implementation of FÉBUS. The “Syndicat mixte des transports Pau Béarn Pyrénées” – Public Transport Authority (PTA) – launched a procurement procedure in 2016 for zero-emission buses and the associated energy production infrastructure. The procurement required high-level performance of the bus operation along the Bus Rapid Transit (BRT) route. PBPM worked with its public transport operator (PTO): SPL STAP, a publicly owned company. After a process lasting several months, the project selected the fuel cell solutions and awarded the contract to a consortium composed of ENGIE and Van Hool. ENGIE took on the role of building and maintaining the hydrogen production and refuelling station (HRI). Van Hool pioneered the development of the 18m long buses, committed to maintaining them for 2 years and provided training to upskill local technicians.

At present, green hydrogen is produced on site by a 0.7 MW PEM electrolyser. It produces between 174 and 268 kg of hydrogen per day. After driving all day, the fuel cell buses are plugged in to one of the 8 refuelling points and are refuelled overnight. The buses’ tanks carry 36 kg of hydrogen, which provides them with over 340 km of autonomy. The HRI was installed in the summer of 2019 and has distributed over 70 t of hydrogen. The buses have covered 810,000 km since being put into service in December 2019. To ensure the success of the project, the PTO provided training to around 100 drivers, as well as 2 technicians who take care of maintenance and control. PBPM also built a dedicated maintenance shed for the fuel cell buses.

Lessons learned and next steps

All parties involved consider the project a success. The development of the fleet was a great learning experience that will facilitate the development of future hydrogen projects. In fact, PBPM has already invested in the deployment of 4 additional 12-meter fuel cell buses.

Both the PTO and the PTA benefitted from the project and have shared their experiences with other European cities, such as Aberdeen, London, Rotterdam, Wuppertal and Cologne. This knowledge-sharing was conducted as part of two European-funded projects – JIVE2 and 3Emotion, FCH-JU funding – that aim to roll out fuel cell buses across Europe.



KEY FIGURES

In operation since December 2019

8 fuel cell buses – 18 m

145 passengers per bus

1 operational hydrogen station

8 distribution points

1 PEM electrolyser

1 storage capacity of < 1t equivalent to **3 days** of service

268 kg hydrogen produced per day

810,000 km driven by the fleet since the launch

70t of hydrogen distributed

600 t of CO₂ avoided per year (not counting the modal shift to public transport)

USEFUL LINKS

- » [Fébus - Pau](#)
- » [Montage A4 flyer 3emotion_05_2020.pdf](#)
- » [La Station Hydrogène - YouTube](#)
- » [Fuel Cell Electric Buses | Knowledge base \(fuelcellbuses.eu\)](#)
- » 3D module to understand how the hydrogen station works (in English and French)
[PAU Mobilités. LES ÉTAPES DE PRODUCTION DE L'HYDROGÈNE \(pau3d.fr\)](#)



CONTACT

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