



**Making an impact
on the clean
energy transition**

TRANSPORT

SHIFTING GEARS TO H₂-POWERED PUBLIC TRANSPORT



Making the change

Hydrogen produced from 'green' sources can play a vital role in zero-emission mobility and achieving Europe's aim of being carbon neutral by 2050. Fuel cell buses (FCB) provide a quieter and smoother ride than their diesel counterparts and produce only heat and water as by-products. Significant progress on the additional costs to operators of buying and running FCB and hydrogen refuelling stations has been achieved, which remain the main barriers to the introduction of this new technology.

National and EU emission reduction targets require operators and public authorities to change to clean transport. FCH JU demonstration projects are increasing the visibility of FCB and promoting the shift from grant funding to self-sustaining commercial finance arrangements.

Paving the way

By bringing together transport operators, public authorities and FCB suppliers, FCH JU co-funded projects are preparing the entire FCB value chain – from regulations and permits to supply of fuel, operation and maintenance of buses. At least nine demonstration projects, including CHIC, JIVE, JIVE 2 and MEHRLIN, have shown that buses and refuelling infrastructure can perform as well as diesel in various urban and climatic conditions. Suppliers involved in JIVE 2 have met the target cost of EUR 625 000 per standard 12 m bus. Data monitoring and assessment performed during JIVE and JIVE 2 will help inform the next steps, while international zero-emission bus conferences are raising awareness about decarbonising public transport.

Hydrogen-powered buses are contributing to cleaner air in cities, reducing emissions of greenhouse gases and other harmful pollutants and meeting growing demand for public transport. Several FCH JU-funded projects are helping the technology evolve from demonstration scale to full commercial use by proving its benefits to the public and authorities.



FCH JU Success Stories



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REDUCING COSTS, IMPROVING RELIABILITY

Deployment of fuel cell buses must happen on a larger scale to encourage competition among manufacturers and reduce the cost of FCB, refuelling stations and hydrogen fuel.

DRIVING LONG-TERM DEMAND

Public funding is helping to ensure that the cost of hydrogen and vehicles is low enough to stimulate demand. JIVE demonstrated that joint procurement processes – although not without problems – can help to achieve sufficient scale. Encouraging operators and public authorities to consider the total cost of ownership keeps the focus on the long-term benefits of clean transport. **The goal?** To increase demand for FCB and governments to regulate for zero-emission public transport to motivate more manufacturers to enter the market. **Key results?** Deployment has evolved from tens of buses in early demonstration projects, such as CHIC, High V.Lo-City, HyTransit and 3Emotion, to hundreds in ongoing projects like JIVE, JIVE2 and H2Bus Europe. With economies of scale, the cost of non-articulated single-deck fuel cell buses fell from over EUR 1 million in 2009 during CHIC, to below EUR 500 000 under the H2Bus Europe consortium, formed in 2019. CHIC showed that HFC buses can match the cost of diesel versions by 2030.

KEY ACHIEVEMENTS

471

buses in total since 2001

310

buses to be deployed by JIVE (142) and JIVE 2 (168) by 2023

65

buses delivered to Cologne, Wuppertal and Aberdeen (JIVE) and Pau (JIVE 2) are in service, the rest have been ordered

>98%

availability of the buses already operational

85 %

Well-to-Wheels emission reductions compared to diesel buses achieved by CHIC FCB

5

hydrogen refuelling stations are operational in 5 out of 17 participating cities in JIVE and JIVE 2 projects

25

Member States foresee the development of hydrogen-powered mobility

EUR 15.5 BILLION

EU investments are foreseen to build hydrogen infrastructure in transportation by 2030

IMPACT

10 YEARS OF OPERATIONS

planned by most projects, compared with 2-3 years in earlier demo projects

CAPEX TARGET

of <EUR 650 000 (JIVE) and <EUR 625 000 (JIVE 2) per non-articulated bus met by several suppliers

ORIGINAL EQUIPMENT MANUFACTURERS

in Europe are responding to growing demand, with 12 now offering fuel cell buses

TRAINING

drivers, technicians and first responders in the new technology (CHIC)

OPERATING RANGE

of over 350 km, similar to diesel buses, achieved by HFC buses in CHIC

FIND OUT MORE



www.fch.europa.eu/page/fch-ju-projects
<https://www.fuelcellbuses.eu/>



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FUEL CELLS AND HYDROGEN
JOINT UNDERTAKING

A partnership dedicated to clean energy and transport in Europe