

3EMOTION BRIDGES THE GAP BETWEEN FUEL CELL BUS DEMONSTRATION & LARGER SCALE DEPLOYMENT



3Emotion demonstrates the successful operation of **21 NEW** and **8 EXISTING** fuel cell buses in **5 REGIONS** in Europe by **7 PUBLIC TRANSPORT OPERATORS** with the required **REFUELLING INFRASTRUCTURE**.



LONDON 10

Transport for London (TFL)
 • 8 existing buses in operation from January 2015 till March 2020 (Wright)
 • 2 new buses in operation from January 2018 till March 2020 (afterwards at Metroline) (VanHool)



VERSAILLES 7

• 2 buses (SAVAC) in operation since September 2019 (VanHool)
 • 5 buses (B.E. green) in operation since August 2020 (Safra)



AALBORG 3

• 1 bus operated by Keolis - Municipality of Aalborg
 • 2 buses operated by Arriva - North Denmark Region
 All buses in operation since March 2020



PAU 3

SMTU/STAP
 • 3 Exqui.city buses in operation since December 2019
 • 5 other buses are part of the FCH-JU project Jive



ROTTERDAM 6

• 4 buses Connexion - Province of South Holland (intercity) in operation since June 2020 (VDL)
 • 2 buses RET - City of Rotterdam in operation since September 2017 (VanHool)

3EMOTION DEMONSTRATES 5 DIFFERENT TYPES OF BUSES

VDL CITEA SLF 120

12 m (Province of South Holland)

VAN HOOL EXQUISITY

18 m articulated (Pau)

SAFRA BUSINOVA H2

12 m (Versailles)

WRIGHTBUS PULSAR

12 m (London)

VAN HOOL A330 FUEL CELL - 13M

London - Versailles - Aalborg - Rotterdam

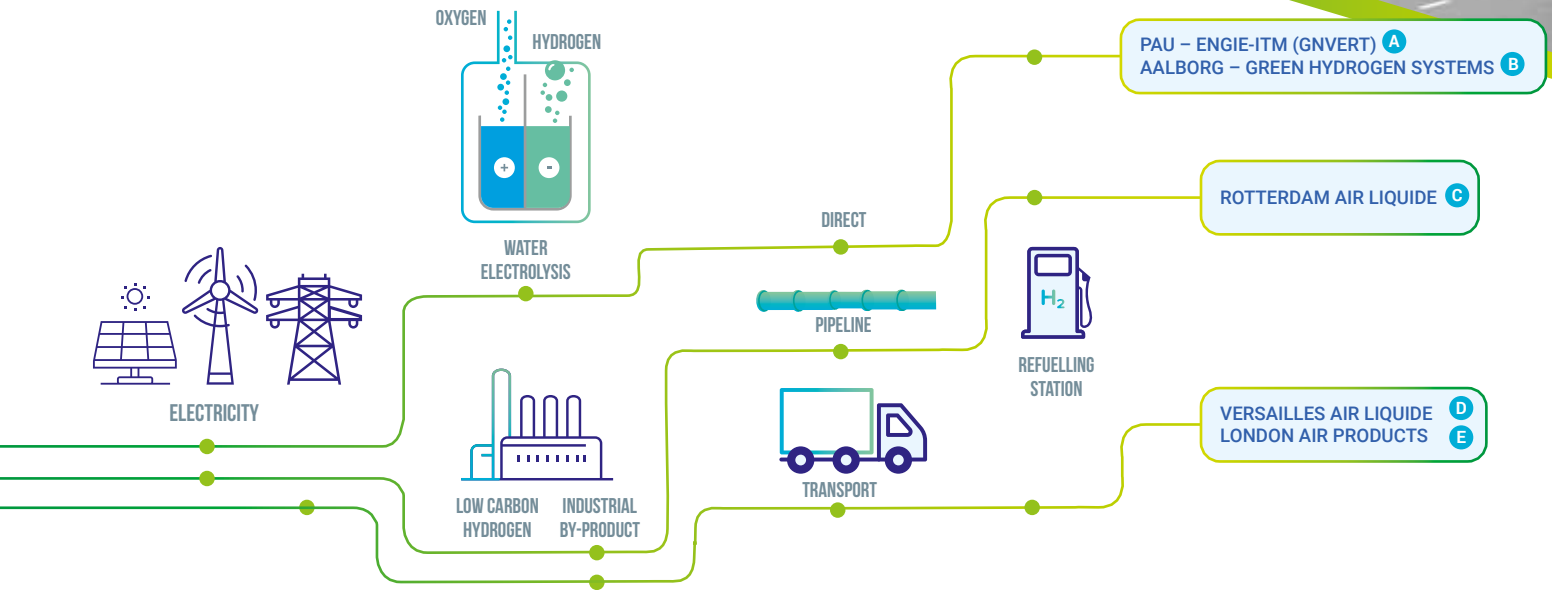


REFUELLING STATIONS

The buses refuel at different kind of refuelling stations. Two refueling stations have an electrolyser on site. The hydrogen is produced via electrolysis of water out of renewable energy. The other refuelling stations use low-carbon hydrogen certified by Guarantee of Origins which is delivered by tube trailers or transported by pipelines. The hydrogen is produced by steam reforming with Carbon Capture or is a by-product of industrial processes.



C ROTTERDAM AIR LIQUIDE



A PAU - ENGIE-ITM (GNVERT)



D VERSAILLES AIR LIQUIDE



© Ben Tasimovic

B AALBORG - GREEN HYDROGEN



E LONDON AIR PRODUCTS



INTERMEDIANT CONCLUSIONS + FACTS & FIGURES

Customers and drivers are enthusiastic about the buses

Drivers and passengers enjoy the buses which produce no harmful emissions and are quieter than conventional fuel buses.



More suppliers

Several models of buses in service (e.g. articulated). Successful expansion and scale up of hydrogen refuelling stations.



Refuelling time and procedure are similar to conventional fuel buses.



Refuelling stations can easily be scaled up when the fleet is growing.

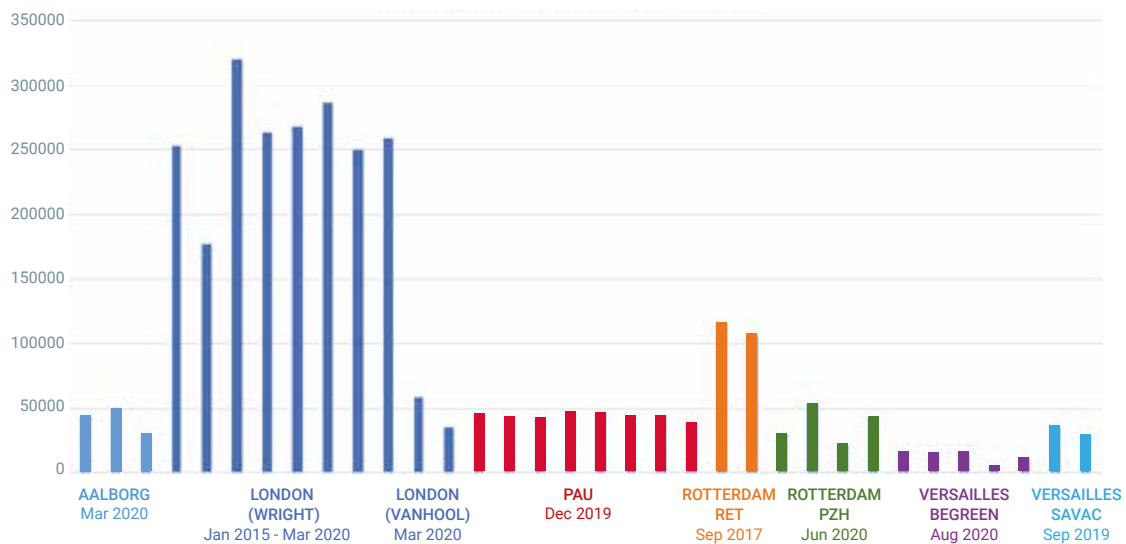


LESSONS LEARNED

- The deployment of vehicles needs to be aligned with the infrastructure construction
- Bus drivers are the best ambassadors: Ensure they are trained well as well before as during the project.
- Ensure technicians and first responders (e.g. firebrigade, ...) are well trained, to be able to start quickly.
- Ensure that there is an efficient supply chain in place: keep spare parts on site.
- Ensure the workshops are well equipped for Fuel cell buses
- Introduce FC buses smoothly: introduction of a new technology takes time.

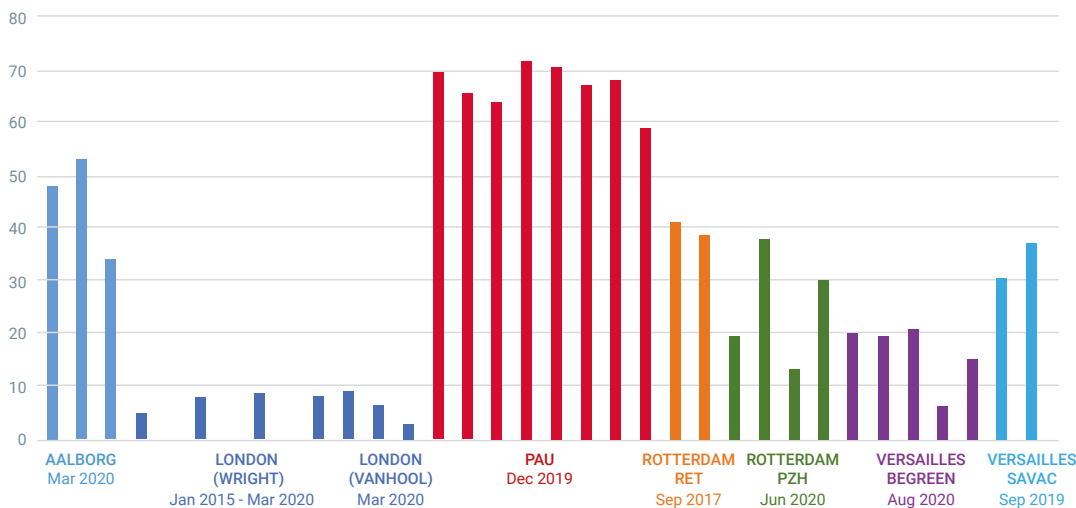
KILOMETERS DRIVEN 30 JUNE 2021 (SINCE THE START OF OPERATION) →

TOTAL OF KM DRIVEN SINCE THE START OF OPERATION
3.153.068 km



WHELL-TO-WHEEL-CO2 EMISSIONS IF BUSES WERE DIESEL IN TONS (PER REGION) ↓

period = 01-Jan-2017 to 30-Jun-2021



WHELL-TO-WHEEL-CO2 EMISSIONS IF BUSES WERE DIESEL IN TOTAL

3.805.464 kg

AVERAGE OF HYDROGEN CONSUMED

9,6 kg/100 km

PARTNERS

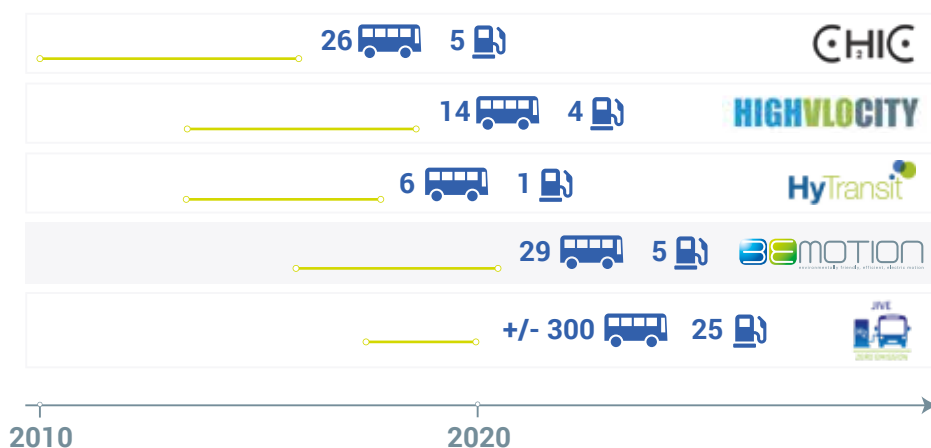


This project is supported by the EU through the FCH-JU under grant agreement 633174 and by a series of local authorities.

3EMOTION ENVIRONMENTALLY FRIENDLY EFFICIENT ELECTRIC MOTION

1/1/2015-31/12/2022

4th H2 bus project of the FCH-JU



WHY FUEL CELL ELECTRIC BUSES?



ONLY EMIT WATER VAPOUR



REDUCING CO2 EMISSIONS AND IMPROVING AIR QUALITY



REDUCED NOISE AND VIBRATION LEVELS



PASSENGERS AND DRIVERS ENJOY THE BUSES



LARGE RANGE WITH ONLY 1 REFILL A DAY (<12 minutes)



READY FOR MARKET DEPLOYMENTS

MORE INFO:

WWW.3EMOTION.EU

WWW.FUELCELLBUSES.EU