

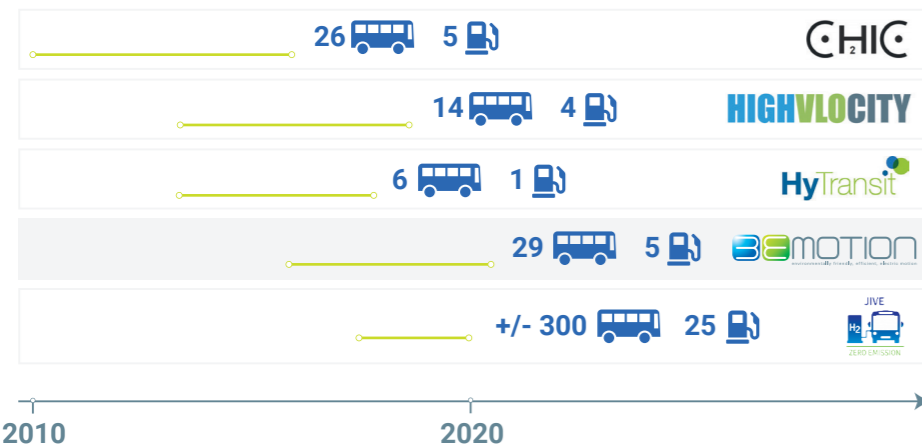
PARTNERS



This project has received funding from the Fuel Cells and Hydrogen 2 Joint Undertaking (now Clean Hydrogen Partnership) under Grant Agreement No 633174 and by a series of local authorities. The Joint Undertaking receives support from the European Union's Horizon 2020 Research and Innovation programme, Hydrogen Europe and Hydrogen Europe Research.

3EMOTION
ENVIRONMENTALLY FRIENDLY EFFICIENT ELECTRIC MOTION

1/1/2015-31/12/2022
4th H2 bus project of the FCH-JU



Clean Hydrogen Partnership
Co-funded by the European Union

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

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**.



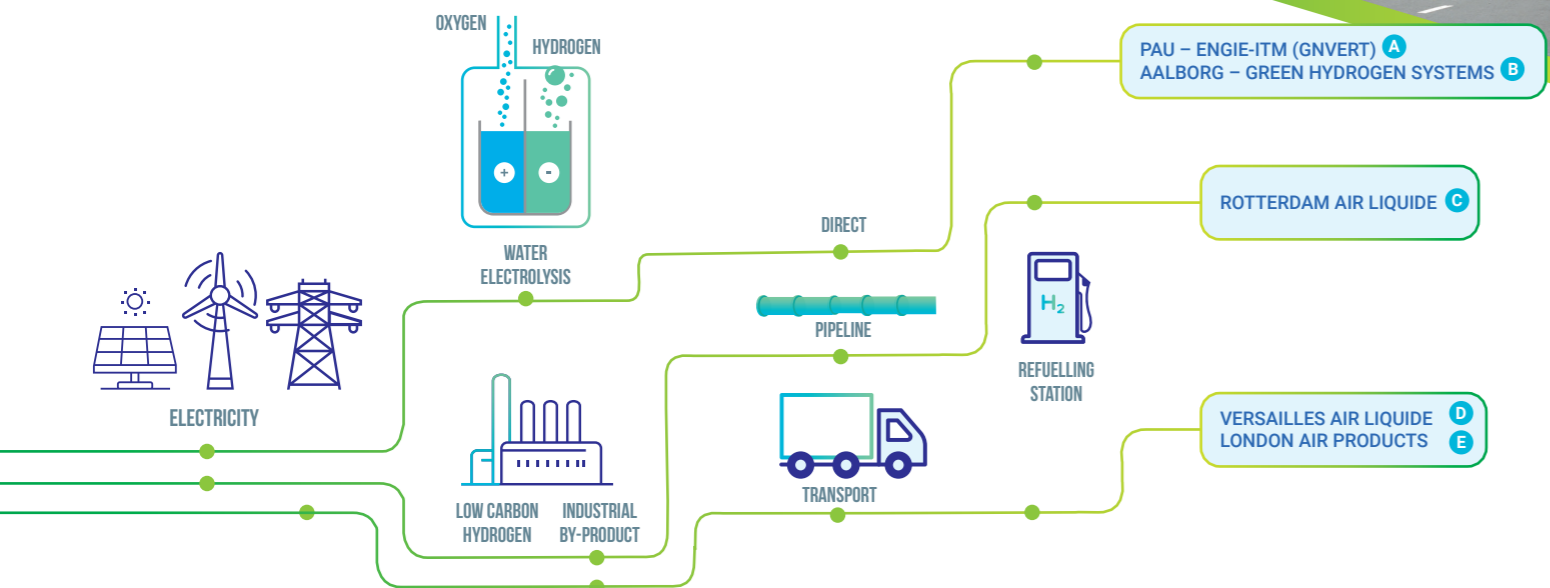
3EMOTION DEMONSTRATES 5 DIFFERENT TYPES OF BUSES

- VDL CITEA SLF 120**
12 m (Province of South Holland)
- VAN HOOL EXQUICITY**
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 Origin, 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.



CONCLUSIONS, LESSONS LEARNED AND FACT & 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.



Technology is ready

Big fleets are operational at several locations in Europe (e.g. in Jive and Jive 2 projects)



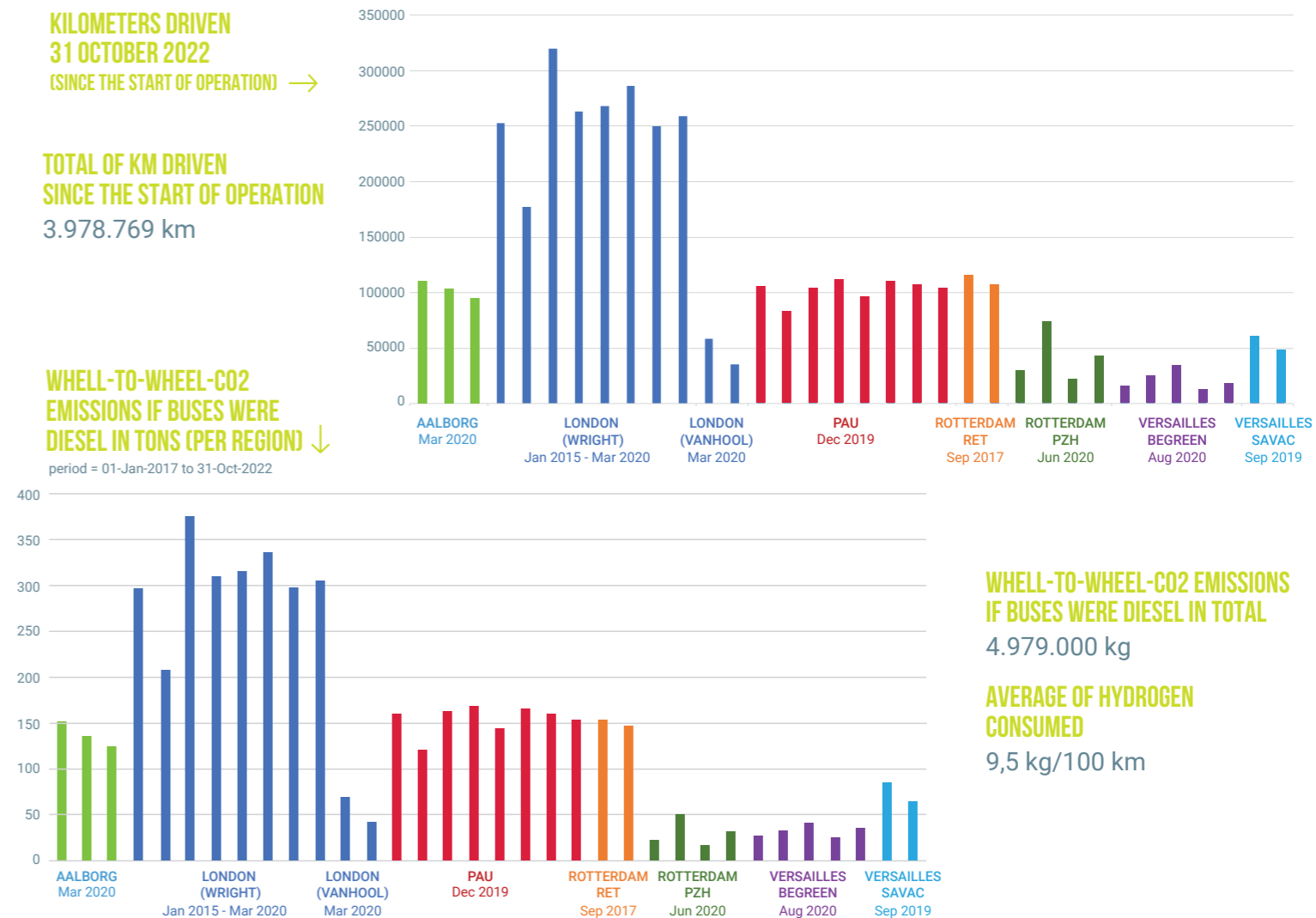
LESSONS LEARNED

- 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 31 OCTOBER 2022 (SINCE THE START OF OPERATION)

TOTAL OF KM DRIVEN SINCE THE START OF OPERATION 3.978.769 km

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



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

4.979.000 kg

AVERAGE OF HYDROGEN CONSUMED

9,5 kg/100 km