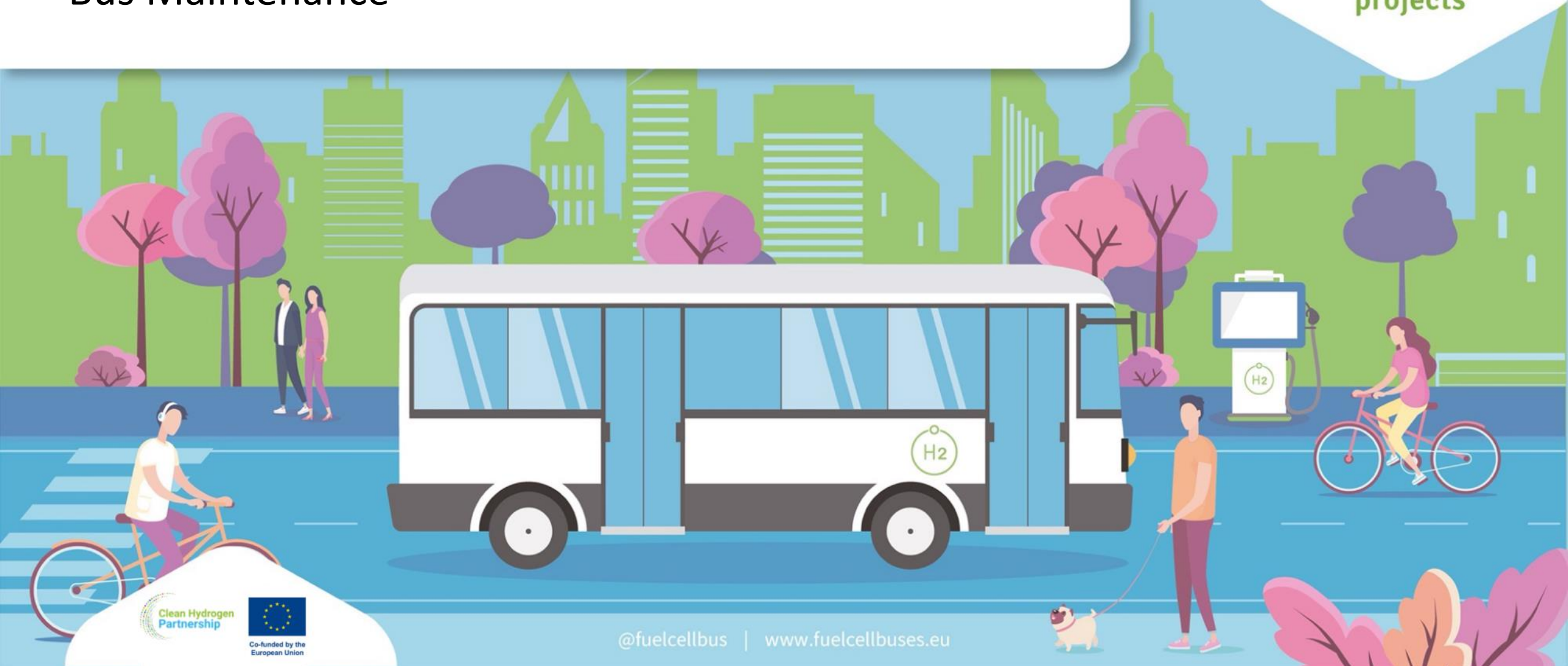


Aberdeen City Council

- Bus Maintenance



**JIVEs / MEHRLIN
projects**



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Wrightbus – Streetdeck Hydroliner FCEV



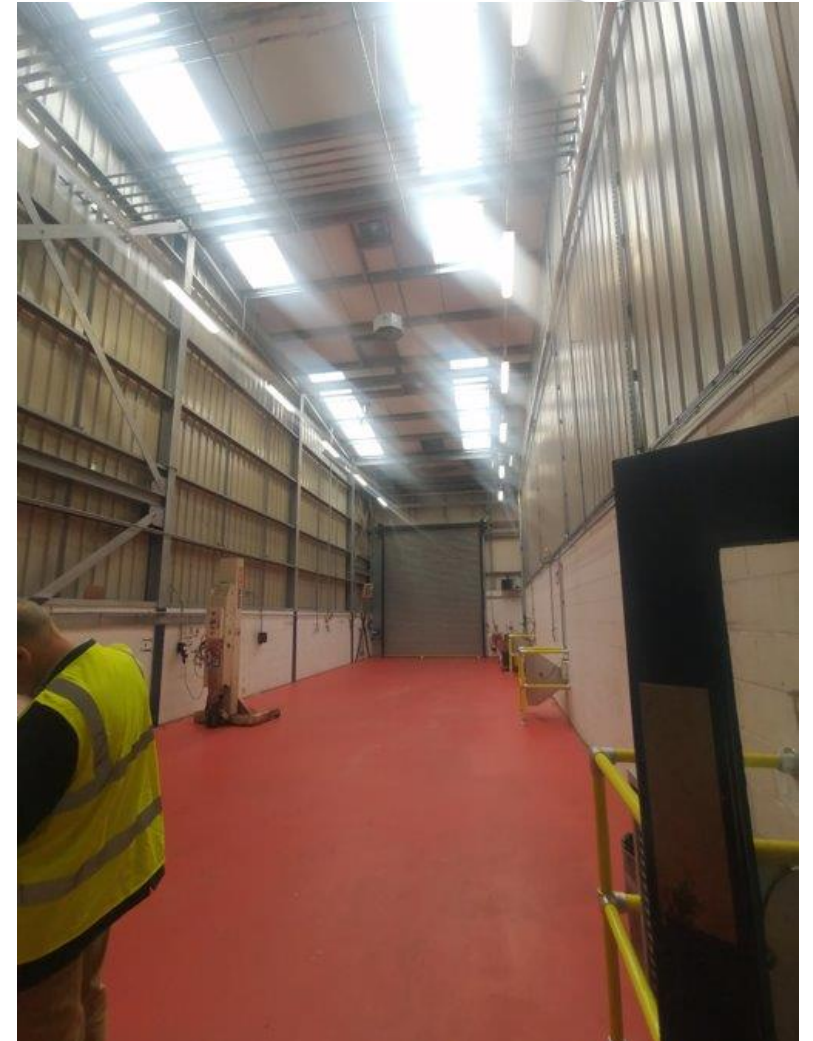
- The world's first hydrogen double deck bus – manufactured in Ballymena, Ireland by Wrightbus
- In service with operator First Bus from January 2021
- A current fleet of 15 with 10 additional buses due later this year



First Bus – Dedicated Maintenance Bay



- Upgrade to maintenance bay at First Bus depot
 - Hydrogen sensors
 - Increased ventilation and lighting
 - Grounding points
 - Managed by TUV





- The issue was discovered during an unrelated vehicle repair by WB Parts & Service team
 - Failures were found on multiple t-brackets on the frame which holds the hydrogen tanks.
 - Frequency modal analysis on the complete tank frame structure confirmed that the natural resonance frequency of the upper, middle and lower tank frame structures was the same as that found on the rear axle (wheel hop frequency).
 - This created two vibrational sine waves superimposing on one another and increasing the load factor from 3 to 5 and therefore increasing the likelihood of early failure.
 - Solution
 - Reinforcing brackets added to the main tank frame along with stabilising brackets
 - Now no longer corresponding natural resonance frequencies.
 - Increase in weight across full bus negligible and so no anticipated impact on bus efficiency
- Aberdeen legacy 15 buses had more extensive damage



- Top three recurring technical issues
 - Red Engine Warning Lights
 - Fuel Cell Fault
 - Battery Thermal Management System (BTMS)
- The same buses show the same recurring issues
- Can be out of service for a couple of hours

- Challenges
 - Wrightbus team onsite to deal with all technical issues
 - 3rd party/contractors – access to Wrightbus reporting portal
 - Certain parts can take time to be delivered (Covid / Brexit)



- Solutions
 - Regular meetings
 - Wrightbus commitment to remain in Aberdeen whilst technical issues are recurring
 - Faults found early in the original 15 buses – checks/repairs made to the new 10 buses prior to arrival in Aberdeen

- Differences with non-FC fleet
 - Issues arising in hydrogen buses requiring more electrical engineering input and there is a requirement to start upskilling the workforce and training more technicians
 - Servicing times are lengthier in hydrogen vehicles – this has an effect on operational timings, staffing etc

The maintenance team



- Maintenance currently carried out by Wrightbus who have a site presence Monday – Friday
- Requirement now for First Bus team to increase confidence/training on hydrogen vehicles – cannot rely on Wrightbus support
- Relationship with Wrightbus is very good, communication and time to resolve issues is efficient. However...
 - Delays are common if 3rd party support/parts are required
 - Supply chain needs to be improved
- Overall First Bus are content with the performance of the fleet and maintenance team, and recognise that the technology is still very new. However, it has been difficult to integrate the hydrogen vehicles into the existing fleet to operate ‘business as usual’.

Thank you for your attention

Project coordination:

elementenergy
an ERM Group company

Project dissemination:



The **JIVE and JIVE2 projects** have received funding from the Clean Hydrogen Partnership under Grant Agreement 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 **MEHRLIN project** is co-financed by the **European Union's Connecting Europe Facility**.

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