

Decarbonising the UK's buses

The UK has been leading the way on zero emission buses, but we must keep up the momentum



Tim Griffen
Zemo Partnership

▶ The transition to zero emission buses (ZEBs) in the UK, has been a big success story. The UK has been leading European counterparts in this transition. In 2023 alone, around 60% of all new buses registered across the UK had drivetrains that were fully zero emission at the tailpipe; either battery electric or hydrogen fuel cell electric. Indeed, 2023 was the first year in which over 1,000 ZEBs had been registered in a single year. This followed two consecutive years where ZEB registrations accounted for 50% of total market registrations in 2021 and 2022 respectively. To date, 2024 is following a similar trend to 2023, with ZEBs registrations sitting at the 60% mark with an expectation that it'll be another record breaker at year end.

So what has driven this progress? The main driver has been government grant funding, and lots of it. Since 2010, the UK Government and devolved administrations have invested around £1bn in zero emissions buses through a variety of mechanisms. This funding has supported rapid technological development to temper fears held by operators that these vehicles wouldn't be up to the challenge.

Transport for London was an early pioneer in trialing new technologies ahead of the rest of the sector, taking the leap beyond the stepping stone of diesel hybrid buses, helping to kick-start the development of zero emission bus technology. TfL accounts for nearly half of the 4,000 zero emission buses in service across the UK today.

Outside London, the transition has been somewhat slower, owing to a lack of operator confidence in the vehicle technology, particularly the longevity of batteries, and associated warranties, as well as the range of vehicles. These worries were, perhaps, exacerbated by the challenges operators faced with earlier diesel hybrid buses, and issues with poor battery performance, plus extensive maintenance requirements. A lack of confidence in the technology was coupled with

the challenge of overcoming the additional capital cost requirement to purchase zero emission buses and accompanying infrastructure, compared to diesel.

This is where government funding schemes have played a vital role in breaking down these barriers. Competitive grant funding schemes in England and Scotland (Wales and Northern Ireland have different mechanisms for allocating funding) began over a decade ago, with a focus on supporting so called 'low carbon' buses - most notably efficient diesel, diesel hybrid and biomethane buses - while zero emission tailpipe buses were still in the trial phase.

As technology developed, more operators took the plunge and invested in zero emission buses at larger scale, supported by government funding. As more zero emission buses were rolled out, the technology continued to develop, and a 'virtuous cycle' kicked. Funding schemes soon ruled out combustion-based technologies, solely funding fully zero emission buses. The latest iterations of these schemes, the Zero Emission Bus Regional Areas (ZEBRA) scheme in England and the ScotZEB Challenge Fund in Scotland, have cumulatively supported the introduction over 2,500 ZEBs and accompanying infrastructure with funding worth over £500m. These schemes have driven registrations across the UK, in tandem with the ongoing decarbonisation of TfL's bus fleet.

According to Zemo Partnership analysis, with funding already allocated to operators, the zero emission bus fleet is expected to reach 20% of the total UK fleet by 2027/28, doubling the 10% milestone reached this year.

While government funding has been crucial to driving the transition, operators and local

transport authority bodies have shown the leadership required by setting tough targets for zero emission fleets. Transport for London was the first to show such leadership, committing to no longer purchasing new diesel vehicles in 2021, with a target for a fully zero emission bus fleet by 2034, or earlier. Large operators like First Bus are taking the initiative too, committing to a zero emission bus fleet by 2035, a target shared with Go-Ahead Group.

Manufacturers have continued to play their part, catering for the needs of operators through rapid technological development. This has focused on improving efficiency and honing battery performance to meet the varying range requirements of the UK's bus services. The batteries have been a particularly point of focus for operators, not knowing when and if they will have to be replaced.

In early generation vehicles, warranties for battery packs were typically no longer than seven years, around the half-life of the vehicle, providing a headache to operators about what to do when that period ends. Fast forward to today, some manufacturers are now offering warranties of 10 years or more as standard, Alexander Dennis for example, recently unveiled a new generation vehicle for the London market with a 14-year or one million km warranty on the battery pack.

Throughout this time, Zemo Partnership has been supporting industry and government to navigate the challenges and find solutions to accelerate the UK bus sector's decarbonisation transition. Formed in 2002 as an initiative of the Powering Future Vehicles Strategy, the - then - Low Carbon Vehicle Partnership (LowCVP) was established to bridge the divide between government and industry to cut emissions from road transport through collaboration and policy development. Following a rebrand in 2021, Zemo Partnership has grown into a membership organisation with around 200 stakeholders from a diverse range of sectors.

Zemo's Bus Working Group has been tackling the challenge of reducing emissions from buses for over 15 years, with a membership

“The zero emission bus fleet is expected to reach 20% of the total UK fleet by 2027/28, doubling the 10% reached this year”

comprised of vehicle manufacturers, bus operators, local transport authorities, technology suppliers, energy providers, trade bodies and finance houses. The diverse nature of stakeholders coupled with Zemo Partnership's technology-neutral, evidence-based approach, has enabled the development of policy and initiatives based on the consensus view of all key, participating stakeholders.

A key area of work that Zemo Partnership has led, is the independent, physical testing and certification of vehicles to determine their eligibility for government funding schemes, a process which first started with the testing of low carbon buses to align with emerging funding schemes. At the beginning of the transition away from standard diesel vehicles, it was deemed necessary to introduce a testing regime to ensure public money supports proven low and zero emission vehicle technologies that will perform in service.

The certificates enable local authorities and bus operators to understand expected performance including drivetrain efficiency, regulated tailpipe emissions and well-to-wheel (WTW) greenhouse gas (GHG) emissions ahead of deployment. The independent nature of testing using a regimented test procedure also provides a means for operators to compare different suppliers and technologies on a like-for-like basis.

The cornerstone of the accreditation schemes has been the industry-informed definition that manufacturers must meet during testing to qualify for government funding. The iterative process has been fully supported by industry and government throughout, ensuring a balance is found between driving technology development and maintaining an accessible market.

The latest iteration is the Zero Emission Bus (ZEB) definition which was introduced to support zero emission bus-focused funding schemes like ZEBRA, as well as the BSOG 22p/km operational incentive for zero emission buses which was introduced in England in 2023. Under the definition, vehicles must have no combustion engines on board (including diesel heaters), produce no regulated emissions from the tailpipe(s) and achieve a 50% well-to-wheel greenhouse gas saving compared to a conventional Euro 6 diesel over the UK Bus Cycle (UKBC).

This definition, builds on previous editions

???

“Without clarity around bus decarbonisation policy, the sector is at risk of losing momentum”

(Low Emission Bus and Ultra-Low Emission Bus definitions), pushing manufacturers to improve vehicle efficiency and develop new systems like fully electric heating and cooling systems (early generations of zero emission buses utilised diesel heaters, which are now banned if government funding eligibility is sought).

Importantly, Zemo Partnership has always pushed the boundaries in terms of emissions analysis, moving beyond regulated tailpipe emissions to assess WTW GHG emissions in support of a truly net zero transport system. In this regard, Zemo hopes to introduce a new element to the accreditation process, looking at life cycle carbon emissions including manufacturing and end of life emissions.

Zemo will continue to work alongside industry and government to ensure any changes are introduced in a manner that works for all.

Zemo Partnership's collaboration with government and industry has not just focused on testing vehicles. Indeed, the Partnership has worked with government to

develop funding mechanisms and see that wider policies work for industry to ensure a sustainable sector. Supporting that is the work Zemo has done in disseminating best practice and learnings from the transition in the form of guides and workshops to openly share information and data in the interest of collaboration and mutual benefit.

To this end, Zemo stands ready to support the UK Government as it looks to address growing uncertainty in the sector around ongoing funding for zero emission buses and the long awaited date for the end of sale of new non-zero emission buses (consulted on in 2022).

With no indication (yet) of more grant funding coming forward for zero emission buses and limited detail on the role of franchising, both operators and manufacturers are looking for answers. More clarity around future policy is needed to maintain the significant progress made to date. Without clarity around bus decarbonisation policy, the sector is at risk of losing momentum, putting an already fragile industry at even greater risk. ■

ABOUT THE AUTHOR

▶ Tim Griffen is programme manager at Zemo Partnership. He manages work focused on heavy duty vehicles, overseeing the Bus and Coach Working Group and associated projects.