BUS DECARBONISATION STUDY

SUMMARY REPORT

Prepared by Sweco, on behalf of Transport Scotland

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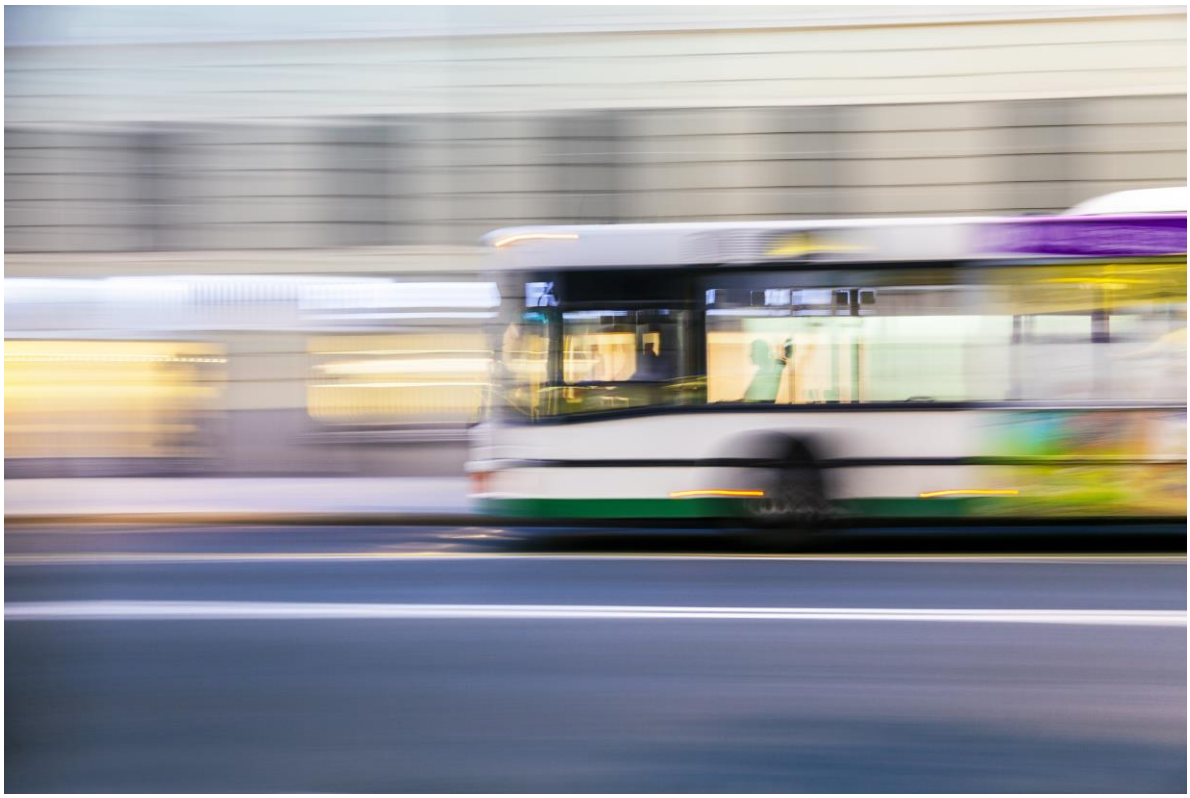

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1 INTRODUCTION AND CONTEXT OF THE STUDY

To accelerate bus decarbonisation, the UK Government introduced the bus Services (No.2) Act 2025. The Bus Services Act gained Royal Assent on 27 October 2025 and provides new powers for Scottish Ministers to prohibit the registration of new non-zero-emission buses on local services in Scotland from a date no earlier than 2030. This is in line with similar powers available to the Secretary of State in relation to services in England. Through qualitative and quantitative stakeholder questionnaires, this study was aimed at exploring the feasibility of implementing this measure within Scotland (hereafter referred to as 'the proposed measure').

The proposed measure will reinforce the Scottish Government's climate change ambitions by setting out the timeline in restricting the use of new non-ZEBs, which will provide more certainty to bus manufacturers and operators in Scotland. Working in collaboration with local authorities and bus operators is crucial to achieving these emissions' goals and creating a legacy for the future. However, there are uncertainties in the receptiveness and preparedness of the measure from Bus Operators (BOs) and Local Transport Authorities (LTAs) in the Scottish context. Transport Scotland (TS) therefore commissioned Sweco UK to undertake a market analysis study on the feasibility of a similar measure in Scotland by interviewing Scottish BOs and LTAs.

The purpose of this study was to enable Scottish regulatory development in relation to climate change, local manufacturing and the Net Zero transition following the proposed UK Government regulatory measure for buses. The study was aimed at exploring BOs and LTAs preparedness and perspectives on the proposed measure as well as understanding the demand for electric buses over the next five years. The surveys broadly covered the four themes shown on Figure 1 below:

Figure 1: Overarching themes of the study

2 SUMMARY OF KEY FINDINGS

The comparative analysis between BOs and LTAs revealed several key considerations and potential strategies necessary for a successful, efficient, and equitable transition to ZEBs through the proposed measure.

The mixed reactions regarding preferred implementation timelines highlighted the need for a balanced approach. While LTAs generally favoured earlier implementation to meet local emission and climate targets, BOs preferred later dates due to operational concerns and the desire to maximise the residual value of their existing fleet. There was a clear consensus that 2030 is too early, and an emerging preference for 2035, suggesting that a phased timeline could provide the necessary flexibility to secure funding and allow for technological and infrastructure advancements.

Secondly, access to government funding emerged as a predominant theme. Both LTAs and BOs emphasised the need for substantial financial support to manage the high upfront costs associated with ZEBs and the necessary infrastructure. Smaller, rural, and long-distance operators face particular challenges in this regard. Smaller operators struggle financially due to a lack of capital, which impacts their ability to invest in new vehicles and infrastructure. Rural operators face unique challenges, such as prohibitively high costs for charging infrastructure due to geographical factors, which could jeopardize their operations. Whilst long-distance coaches face logistical challenges with the range of ZEBs and the need for charging infrastructure along routes. These complexities call for targeted policies and funding models to ensure these ‘vulnerable’ operators are not disproportionately impacted.

Thirdly, the disparity in current fleet composition and depot infrastructure between LTAs and BOs points to the necessity of tailored strategies. LTAs lag with ZEB adoption and have limited charging infrastructure compared to BOs, who are more advanced in their electrification efforts in terms of fleet, depots and decarbonisation plans. Consequently, the regulatory approach must consider these differences, providing specific support to LTAs to bridge the gap and encourage BOs to continue their progress.

Moreover, the barriers to decarbonisation identified in the surveys—cost, shortage of skilled personnel, limitations of current ZEB technologies, and infrastructure constraints—underscore the need for consideration of the bigger picture. Accelerating decarbonisation

timelines will require not only funding but efficient financing models, enhanced product availability, and national commitment to expanding grid capacity. Clear guidance from the Government will be crucial in navigating these complexities.

Given the varied adaptability and local context of different operators and authorities, a phased approach with stepped timescales and tailored funding models could facilitate a smoother transition. Additionally, the Government could explore the role of other technologies such as HVO-fuels or hydrogen in tandem with ZEBs, during the phased transition. This would reduce emissions whilst mitigating hard constraints such as lack of grid capacity, which is reportedly a particularly hard constraint for rural operators. The strategy should aim to mitigate the additional imposed costs on disadvantaged operators and passengers, ensuring a fair regulatory approach that supports all stakeholders in achieving decarbonisation goals.

3 CONCLUSIONS AND NEXT STEPS

From the stakeholder engagement and interviews undertaken as part of this study, key sentiments and observations around the four overarching themes emerged (Figure 1). These, alongside the key conclusions and proposed recommendations are presented in Table 1.

Table 1: Summary of key findings, conclusions and recommendations

THEME	KEY STAKEHOLDER SENTIMENTS AND FINDINGS	CONCLUSIONS AND RECOMMENDATIONS
VIEWS ON REGULATORY APPROACH	The proposed measure is generally welcomed as part of efforts to adapt to and mitigate accelerating environmental and climate risks, while supporting local and national decarbonisation objectives. The general consensus was that the proposed measure must be carefully and comprehensively implemented and executed, with due consideration for local contexts and differences. LTAs generally favoured earlier implementation dates. They emphasised the necessity of decarbonisation efforts to meet local emissions targets. BOs, on the other hand, expressed operational and technological concerns limiting their ability to rapidly transition to ZEBs. They thus tended to favour a later implementation date compared to LTAs. Smaller, rural and long-distance operators and councils were raised as key areas of concern. These operators are facing particular challenges most prominently in regard to the added costs of ZEBs and ZEB infrastructure but also in administrative capabilities and geographical challenges. Stakeholders expressed a shared concern that the proposed measure may disproportionately affect smaller operators, for instance, those who rely on the second hand vehicle market, could risk being pushed out of the market. Some, but not all stakeholders, maintained that these vulnerable operators warrant exemptions. Others emphasised that targeted, equitable support and funding should be prioritised over “hard” exemptions, to enable a just transition to ZEBs, particularly for vulnerable operators.	• Develop a phased timeline for implementing ZEB regulations, starting with more feasible targets and gradually increasing the requirements. • Offer proportionate funding to support BOs and LTAs in purchasing ZEBs and installing necessary infrastructure. Particular attention should be put on smaller operators with less resourcing and administrative capabilities. • Further analysis is required to understand how the proposed measure would impact rural and isolated areas where additional challenges in grid capacity, access to financial capital, resourcing and developing charging infrastructure are more acute.

THEME	KEY STAKEHOLDER SENTIMENTS AND FINDINGS	CONCLUSIONS AND RECOMMENDATIONS
ESTABLISHING BACKGROUND	The survey revealed substantial variation in the current state of fleet and depot ZEB accommodations between and across LTAs and BOs. Both LTAs and BOs emphasised that their ability to expand or implement charging infrastructure depend in most part on access to funding. Also, local grid capacity was expressed as a key barrier, entirely outside the control of stakeholder remit. LTAs lag in adopting ZEB fleets, with 94% of their fleets still being diesel-powered and only two councils operating electric buses for public bus services, with diesel mini-buses dominating the LTAs' fleet. BOs show a higher adoption rate of ZEBs, comprising 20% of their total fleet. BOs operated a more diverse route profile, including urban and intercity services with varying distances compared to LTAs, which predominantly run rural PSV services., This introduces an added complexity of ZEB transitions, and as such justify the BO's general preference for a later implementation date. Many respondents raised concern regarding range, specifically how a one-to-one ZEB replacement to cover their existing vehicle ranges and services is lacking.	• Closing the range and cost parity between non-ZEBs and ZEBs and accelerating grid readiness through coordinated planning between transport authorities, network operators and industry, enabling sufficient and cost-effective delivery of charging and energy infrastructure. • Implementation of a nationwide ZEB ban should be underpinned by long-term, ring-fenced funding and accessible financing mechanisms to enable operators and authorities to deliver and expand bus fleet decarbonisation programmes with confidence. • Tailored funding models should be considered for vulnerable operators such as those operating in rural and isolated areas, or those who are operating on smaller scales such as family run local services.

THEME	KEY STAKEHOLDER SENTIMENTS AND FINDINGS	CONCLUSIONS AND RECOMMENDATIONS
DECARBONISATION PLANS AND BARRIERS TO DECARBONISATION	LTAs showed a mixed level of implementation regarding decarbonisation plans for bus fleets. Approximately 40% of LTAs and 75% of BOs had established decarbonisation plans. For many of these, stakeholders identified challenges in providing specific details and measures such as purchasing plans and timelines. They pointed to the uncertainties of the current landscape and lack of funding as key barriers for the further development of their decarbonisation plans. Many of the same factors acted as key barriers for the stakeholders who had no decarbonisation plans in place. Most prominent was the cost barrier of developing decarbonisation plans, shortage of skilled personnel and uncertainties in the regulatory landscape. For many LTAs, the decarbonisation plans in place where in relation to wider council wide plans as opposed to bus fleet specific. The consensus was that LTAs and BOs ability to decarbonise depend in most part on funding, to manage the upfront cost and associated infrastructure requirements. However, as expressed by most respondents, funding alone is not sufficient to overcome the barriers. Respondents also felt somewhat limited by current ZEB technologies and infrastructure. It was made evident that current cost-efficient ZEBs available in the market and local grid capacity does not allow for a one-to-one substitution with non-ZEBs to cover the diversity of bus types, routes and distances identified in the sample. Complexity arises from other commercial factors which lie beyond the remit and control of BOs, LTAs and the Scottish Government. These were increased product availability, overall cost reductions and improved ZEB range in particular and may suggest justification for a later date for the proposed ban. There was also raised concerns for rural operators in regard to ZEB infrastructure. As storm related power outages are becoming quite frequent, consideration	• Provide regulatory certainty through clear, consistent and long-term policy signals, including defined timelines, compliance requirements and technical standards, to reduce investment risk and support informed decision-making in a rapidly evolving ZEB market. • Adopt a whole-system approach to implementation, ensuring alignment with wider transport and regulatory objectives such as congestion management, cross-council networks, grid capacity constraints and policies aimed at reducing private car use. • Strengthen workforce capability by supporting partnerships with training and skills providers, ensuring sufficient stakeholder capacity in vehicle operation, maintenance, charging infrastructure and grid integration to support large-scale ZEB deployment. • Explore and consider complementary or transitional solutions, including alternative fuels, where appropriate, to ease the transition for operators with challenging operational profiles

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	should be given to the compatibility of ZEB charging infrastructure in such areas.	