



**Gallagher**

Insurance | Risk Management | Consulting

## TOGETHER IN ELECTRIC REALITY: FIRE PREVENTION IN THE BUS AND COACH SECTOR

The direction of travel for vehicles is undoubtedly electric; current requirements stipulate that commercial operators must convert to alternative fuel sources by 2040 at the latest. The looming deadline has prompted a flurry of activity in the bus and coach sector. The advantages of the move to electric are clear: vehicles are emission-free, provide a quieter, smoother ride for passengers and have lower operating costs than diesel. Yet, this vital development within the energy transition is not without risks, which must be understood and managed carefully.

As one of the leading brokers in passenger transport, Gallagher recently held a seminar for its insurer partners, together with electric bus manufacturer Alexander Dennis, bus operator Go-Ahead Group, Driver and Vehicle Standards Agency (DVSA) and British Engineering Services, where we discussed what all parties were doing to shape the risk management and controls of this evolving technology to enable underwriters to better understand the new exposures it presents.

In the race towards net zero, the bus industry currently has the edge over its car counterpart. In the European city bus market, battery-electric accounted for 29.7% of all vehicle registrations last year, up from 21.7% in 2021 and 14.8% in 2020. The UK leads Europe in battery-electric buses, with 685 vehicles registered last year.<sup>1</sup> The UK Government aims to accelerate electric bus adoption via its Zero Emission Bus Regional Area (ZEBRA) fund, which opened for applications in 2022. Availability is increasing too; alongside Alexander Dennis, there are 12 other manufacturers of all electric buses in the UK.<sup>2</sup>

### **Any moving vehicle represents a fire risk**

Lithium Nickel Manganese Cobalt (NMC) and Lithium Iron Phosphate (LFP) are the core battery chemistries used for battery-electric bus applications—both chemicals are less prone to fire risk than diesel. Nevertheless, batteries carry a significant amount of energy. Consequently, when fires occur, the results can be dramatic, and the losses can be greater because of how these fires develop.

---

### **The DVSA has conducted a full investigation into thermal incidents on public transport and its findings will be published shortly.**

---

The agency was able to share a couple of exclusive stats—since January 2021, there have been just four recorded incidents involving battery-electric buses, three unrelated to the battery, compared to 122 incidents for fires/thermal incidents on diesel buses.

Nevertheless, recent battery-electric bus fires have prompted concern from insurers—the Switch Mobility Potters Bar bus fire in May last year<sup>3</sup> and the Alexander Dennis Notts Connect bus fire were cited as examples. However, similar to the DVSA's recent stats, the battery did not cause either fire. While the final report is yet to be published, it is believed the incident in Potters Bar resulted from incorrect coolant being added to the battery cooling circuit resulting in an internal short-circuit. The root cause of the Alexander Dennis bus fire was a loose connection in the driver's cab heater circuit, resulting in a spark igniting the junction-box housing.

### **Battery safety**

Safety is paramount for battery-electric bus manufacturers. The battery and automotive industries have expended vast amounts of time and effort on risk prevention and mitigating battery fires.

Alexander Dennis upholds a functional safety approach to risk mitigation, with four levels of security.

<sup>1</sup><https://www.route-one.net/news/uk-leads-europe-in-battery-electric-buses-figures-show/>

<sup>2</sup><https://connected-energy.co.uk/industry-insights/powering-electric-commercial-vehicles-how-battery-energy-storage-can-support-the-transition-to-electric-buses-and-trucks/>

<sup>3</sup><https://www.thefpa.co.uk/news/fire-at-potters-bar-bus-depot>

**Avoid**—The battery monitoring system (BMS) constantly monitors single cells, and if they are operating outside of parameters, they are shut down. Cells operate within strings; if there is an anomaly, any string can be shut down but the vehicle can still operate to be driven to a safe place.

**Detect**—In addition to the BMS, sensors within battery packs can detect any temperature change, hydrogen emission or coolant leak. Upon detection, a signal is sent to the BMS to shut down the relevant battery string.

**Withstand**—In the unlikely event that levels one and two are breached, batteries are extensively tested to ensure cells, modules and packs are resilient to a thermal event without triggering the thermal runaway of adjacent battery packs. Testing includes, but is not limited to, the nail penetration test to simulate severe road debris hitting the battery pack, abusive overcharging and flooding.

**Contain**—Level four is concerned with the unknown; experience has shown that scenarios beyond the experience and imagination of engineers are possible. Therefore, batteries are enclosed within a steel container, a vent system guides hot gases away from high-risk areas, an additional thermal barrier between driver and battery, and all glass-reinforced plastic surrounding areas where batteries are placed are specified to class-1 fire resistance. This level of security is important as battery-electric buses currently operate alongside diesel vehicles in depots.

If a diesel vehicle catches fire and it spreads in the depot, the steel containers should prevent the batteries from also igniting.

## Telematics potential

Operators have always liaised closely with the fire service and continue to do so as technology develops. Now they are also engaging with manufacturers regarding telematics, and Go-Ahead said there is more scope for development in this area.

The vast majority of battery-electric buses have telematics data monitoring as standard. Telematics can measure battery performance, operator usage and vehicle performance. As well as providing information to operators on the status and efficiency of every vehicle in their fleet, the system allows data to be collected and transmitted back to engineers to facilitate a state of health monitoring of every cell. In extreme circumstances, a battery system can be shut down remotely.

## Operational evolution

The perception of battery-electric buses is changing, and operators must establish risk management to manage this multi-staged transformation, which is especially challenging while electric and diesel buses coexist.

Battery-electric buses depend upon charging stations, and the number of charging stations must meet demand. How and where buses are charged is a fundamental risk issue for operators, and buses charging overnight in workshops is a concern. Go-Ahead depots are updating their emergency charger shut-down procedure, standardising the approach and embedding a rigorous maintenance schedule.

Depot congestion is a problem for operators; most companies are always searching for new sites. If buses require more space to

adhere to best practice guidelines, this could cut the fleet down by as much as 25%, severely impacting the financial viability of the depot. One possible solution is for the power banks to be situated outside the depot with small charging cables inside.

## Conclusion: This is only the beginning

Insurers are keen to support battery-electric buses, but they are understandably cautious about the potential for catastrophic thermal incidents, however small this may be. Our seminar does not draw a line under the risks posed by battery-electric vehicles; instead, it was the first of many opportunities to facilitate conversations and awareness of these emerging risks. Gallagher will be on hand, supporting all our partners as this landscape evolves and develops. Only by working together will we find solutions to transition from fossil fuels towards a sustainable future.

## Would you like to talk?

### Phil White

National Practice Leader—  
Transportation

T: +44 (0)7803 200 518

E: Phil\_White@ajg.com

### Mark Bunbury

Managing Director—Kings Hill Office

T: +44 (0)7803 200 519

E: Mark\_Bunbury@ajg.com

Data provided by DVSA and Alexander Dennis Notts is correct as at June 2023.

## CONDITIONS AND LIMITATIONS

The sole purpose of this document is to provide guidance on the issues covered. This article is not intended to give legal advice, and, accordingly, it should not be relied upon. It should not be regarded as a comprehensive statement of the law and/or market practice in this area. We make no claims as to the completeness or accuracy of the information contained herein or in the links which were live at the date of publication. You should not act upon (or should refrain from acting upon) information in this publication without first seeking specific legal and/or specialist advice. Arthur J. Gallagher Insurance Brokers Limited accepts no liability for any inaccuracy, omission or mistake in this publication, nor will we be responsible for any loss which may be suffered as a result of any person relying on the information contained herein.

[A.JG.com/uk](https://www.ajg.com/uk) | [gallagher-uk](https://www.linkedin.com/company/gallagher-uk) | [@GallagherUK](https://twitter.com/GallagherUK)

Arthur J. Gallagher Insurance Brokers Limited is authorised and regulated by the Financial Conduct Authority.  
Registered Office: Spectrum Building, 7th Floor, 55 Blythswood Street, Glasgow, G2 7AT.  
Registered in Scotland. Company Number: SC108909. FP800-2023 Exp. 21.06.2024.

© 2023 Arthur J. Gallagher & Co. | GGBRET5950



**Gallagher**

Insurance | Risk Management | Consulting