ZETA | ZERO EMISSION TRANSPORTATION ASSOCIATION

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Mr. Paul Roberti
Administrator
Pipeline and Hazardous Materials Safety Administration
United States Department of Transportation
1200 New Jersey Ave SE
Washington, D.C. 20590

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RE: Docket No. PHMSA-2025-0678 (Notice No. 2025-06)
Hazardous Materials: Request for Feedback on Hazmat Transportation Risks: Heavy-Duty Electric Vehicles Versus Internal Combustion Engine Motor Carriers

Dear Mr. Roberti,

The Zero Emission Transportation Association (ZETA) is an industry coalition representing approximately 40 companies spanning the electric vehicle (EV) and battery storage supply chain end-to-end, including critical mineral and material producers, cell and battery manufacturers, vehicle manufacturers, charging companies, electric vehicle supply equipment (EVSE) providers, utility companies, and battery recyclers. EVs and associated infrastructure represent a growing sector of domestic manufacturing and technological innovation. Policies that advance these technologies are critical to ensuring competition abroad and promoting safe and reliable transportation of goods and services.

We would like to express our gratitude to the U.S. Department of Transportation (DOT) Pipeline and Hazardous Materials Safety Administration (PHMSA) for inviting public input on transporting hazardous materials using heavy-duty electric vehicles (HDEV) and ensuring that the public's perspectives and ideas are considered. ZETA thanks DOT for the opportunity to submit our comments on this important transportation safety topic.

With promising HDEV products entering the U.S market and attractive total cost of ownership benefits for fleet operators, this is an area ripe for innovation and is likely to see robust growth in the years ahead, while bolstering jobs and local economies as manufacturing scales up.[1] Our members are committed to ensuring that electrified transportation technologies advance safety outcomes through rigorous engineering, data-driven analysis, and close coordination with federal agencies and first responders.

[1] https://assets.bbhub.io/professional/sites/24/Zero-Emission-Commercial-Vehicles-Factbook-2025.pdf

PHMSA's RFI appropriately seeks to evaluate the safety implications of emerging heavy-duty EV technologies. HDEV technology is nascent, but offers promising capabilities to the nation's freight transportation system. However, public discourse surrounding EV fire risk has, at times, been shaped by anecdotal rather than empirical evidence. As discussed below, the best available research from federal agencies, standards organizations, and independent laboratories demonstrates that EV fire risks are both less frequent than those associated with internal combustion engine ("ICE") vehicles and comparable in severity across key metrics. Moreover, as research continues on the topic of EV fire safety, the distinct characteristics of EV fires are increasingly well understood and can be effectively managed by first responders. At the same time, ZETA agrees that additional, targeted research—particularly in the heavy-duty context—is warranted and should be prioritized through coordinated federal action.

I. EV Fire Risk Should Be Evaluated on Empirical Evidence and Research

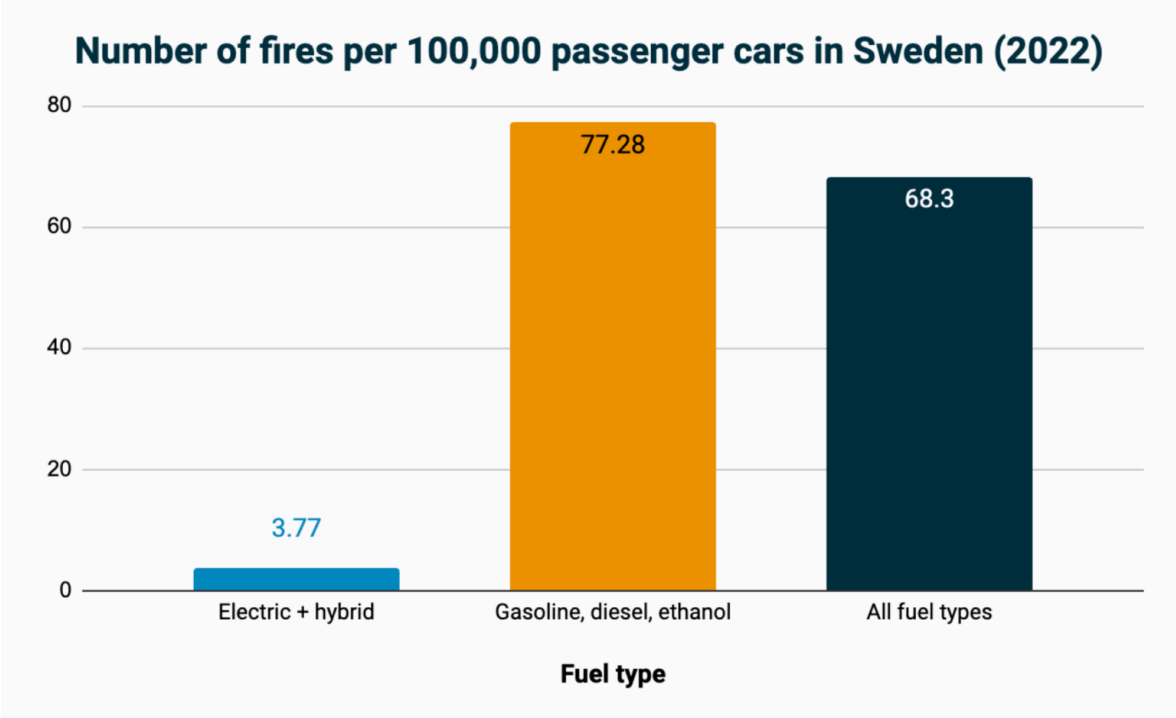
Data Indicate EV Fires Occur Less Often Than ICE Vehicle Fires

A central theme of PHMSA's RFI is examining whether HDEVs present a unique or heightened danger relative to ICE vehicles when transporting hazardous materials ("hazmat"). The available empirical evidence on EVs indicates that concerns about them are often overstated.

Existing empirical data indicates EV fires occur less frequently than ICE vehicle fires when adjusting for fleet size. Data compiled by the National Fire Protection Association ("NFPA") show that the overwhelming majority of vehicle fires in the United States involve gasoline- or diesel-powered vehicles.[2] International analyses similarly find that EVs experience significantly lower fire incidence rates than ICE vehicles when normalized for fleet size.[3]

[2]https://www.nfpa.org/education-and-research/research/nfpa-research/fire-statistical-reports/fire-loss-in-the-united-states.

[3] https://pluginamerica.org/the-facts-about-ev-fire-safety/.



Source: MSB of Sweden, 2023 and Plug-in America

While methodologies vary, the direction of available data is consistent: EVs are not more prone to fire than similar ICE vehicles.

EV and ICE Vehicle Fire Causes are Similar

The causes of EV fires are often similar to those of ICE vehicles and are not unique to electrification. Available research indicates that the most common causes of EV fires include collisions, external damage, battery faults, or overheating. These causes are broadly analogous to the leading causes of ICE vehicle fires, such as fuel system failures, electrical faults, or crash damage.[4] Importantly, a meaningful portion of vehicle fires—across all powertrains—are attributable to external factors such as arson or fire spread, rather than intrinsic vehicle design.[5]

EV and ICE Vehicle Fire Behavior

EV and ICE vehicles exhibit broadly comparable fire behavior when evaluated holistically. Experimental research conducted by the Underwriters Laboratory Fire Safety Research Institute ("FSRI") demonstrates that both EV and ICE fires produce substantial heat, toxic gases, and hazards requiring full firefighter protective measures.[6] While EV battery fires may involve thermal runaway and longer burn durations in some scenarios, ICE vehicle fires often involve rapid ignition of liquid fuels and sustained combustion. In controlled testing environments, EV fires may produce higher short-duration peak temperatures, whereas ICE fires may sustain

[4] *Id.*
[5] *Id.*
[6] https://fsri.org/research-update/experiments-enabling-analysis-electric-vehicle-fire-behavior-are-completed.

elevated temperatures over longer periods. These differences are operationally relevant but do not support the conclusion that EV fires are inherently more dangerous.[7] For example, tunnel infrastructure to address vehicle fire is generally agnostic to vehicle type and designed to serve all fire types. Operationally, firefighting techniques and methods are modified to address vehicle type upon arrival. Existing research indicates that EV fires in any location do not represent an increased risk to first responders, just a different type of risk that can be mitigated through first-responder training and education.[8]

EV battery systems also incorporate design features that can provide safety advantages in certain scenarios. Unlike gasoline vehicles, where fuel is stored in a single tank and can ignite rapidly, EV battery packs are composed of distributed cells that may ignite progressively. Research indicates that this can provide a delay between initial failure and full ignition, allowing additional time for fire suppression.[9] Modern EVs also include battery management systems, thermal controls, and automatic disconnect mechanisms designed to prevent or mitigate thermal events.

A review of available data and research does not support the claim that EVs present a greater overall fire risk when compared to ICE counterparts. Reputable authorities on fire safety, such as NFPA, have stated there is no evidence that EVs are more likely to be involved in fires than ICE vehicles. Moreover, existing data from the US and abroad suggest the opposite.[10] Rather than presenting a fundamentally new hazard, EVs introduce a different fire profile that is increasingly well understood and incorporated into engineering standards and emergency response best practices.

HDEV Charging Has No Increased Risk As Compared to ICE Vehicle Fueling

Existing safety protocols for HDEV charging in the applicable product certification standards (like those promulgated by Underwriters Laboratories and the Society of Automotive Engineers) and National Electrical Code (NEC) installation standards already take into consideration every application, at a diversity of occupancy and location types, and under most environmental conditions.[11] Therefore, no special consideration needs to be made at charging stations for vehicles carrying hazardous materials, as compared to ICE vehicle fueling stations. For example, the 2026 National Electrical Code has added HDEV emergency shut-off requirements that are similar to the emergency shut-off requirements for fuel dispensing equipment.[12]

II. A Robust and Expanding National Framework Exists to Train and Educate First Responders on EV Fire Safety

[7] *See https://fsri.org/research-update/experiments-enabling-analysis-electric-vehicle-fire-behavior-are-completed*; https://fsri.org/research-update/ev-fires-vs-gas-powered-vehicle-fires-air-contamination-risks-explored-new-article.
[8] *Id.*
[9] https://www.fairfaxcounty.gov/environment-energy-coordination/climate-matters/EV-less-fire-risk.
[10] https://www.energy.gov.au/electric-vehicles/electric-vehicle-basics/electric-vehicle-facts.
[11] *See* https://www.ul.com/resources/youve-got-power-essential-guide-ev-charging, and https://www.sae.org/taxonomies/vehicle-charging.
[12] *See* https://www.nfpa.org/codes-and-standards/7/0/nfpa-70.

The RFI considers the important topic of readiness of first responders to address EV fire-related incidents. First responder safety is of the utmost importance to ZETA and its members as it relates to EV fire response. In practice, a comprehensive and rapidly evolving national framework for training and educating first responders on EV fires already exists.

Federal agencies, standards organizations, and independent research institutions are actively engaged in EV fire safety education and training. For example, The National Highway Traffic Safety Administration ("NHTSA") has developed standardized emergency response guides and supports ongoing battery safety research.[13] NFPA also maintains extensive training programs and guidance for EV fire response. These programs include free electric vehicle community preparedness online training for the public, and first responder training on responding to incidents involving alternative fuel vehicles, including EVs.[14] FSRI also conducts large-scale fire testing and disseminates research-based training materials.[15] Professional organizations such as the International Association of Fire Chiefs[16] and International Association of Fire Fighters[17] further coordinate training and operational best practices across jurisdictions. Importantly, evolving research and field experience have led to improved tactical approaches that directly address the characteristics of lithium-ion battery fires.

Industry collaboration has further strengthened responder preparedness. Vehicle manufacturers routinely conduct joint training exercises with fire departments, provide detailed emergency response guides, and engage in research partnerships. ZETA's recent Fire Safety Solutions Summit highlighted the importance of integrating national-level research with local training delivery, as well as the need for continued coordination among stakeholders.[18]

Looking forward, the recent implementation of the National Emergency Response Information System ("NERIS") will significantly improve incident data collection and analysis, enabling more precise understanding of EV fire frequency, causes, and outcomes.[19]

III. Targeted Research Is Needed to Address Questions Raised by Nascent Heavy-Duty EV Technology in Hazmat Transportation Scenarios

While existing data provide a strong foundation for understanding EV fire risk, additional research is a necessary precursor for any determination around electric vehicles and hazardous materials transportation.

A key challenge is that empirical data on Class 8 truck fires remain limited across all powertrain types. Existing literature often focuses on passenger vehicles or cargo-related fire risks rather than isolating propulsion system effects. As a result, there is a need for technology-neutral research comparing EV and ICE heavy-duty vehicles under equivalent conditions.

[13] https://www.nhtsa.gov/vehicle-safety/electric-and-hybrid-vehicles.
[14] https://www.nfpa.org/education-and-research/energy-transition/electric-vehicles#training.
[15] https://fsri.org/programs/training-education.
[16] https://www.iafc.org/learn-and-develop/iafc-academy-courses.
[17] https://www.iaff.org/hazmat-training/.
[18] https://www.linkedin.com/feed/update/urn:li:activity:7384666355511476224.
[19] https://neris.fsri.org/.

ZETA recommends prioritizing research in several areas. Comparative studies of fire dynamics—including heat release rates, burn duration, and fire spread—are needed to better understand heavy-duty vehicle risks across drive trains. Further validation of suppression strategies at scale will ensure that existing firefighting techniques remain effective for larger battery systems. Post-incident handling—including towing, storage, and recycling of damaged EV batteries—requires additional study to address operational and economic challenges to fire departments and municipalities identified by first responders. Continued investment in battery diagnostics and early warning systems will further support prevention and mitigation efforts. Finally, research into confined environments such as tunnels, ports, and freight corridors will inform infrastructure design and emergency response planning.

Federal leadership is critical to advancing this research agenda. Coordinated efforts across PHMSA, NHTSA, the U.S. Department of Energy, and the U.S. Department of Homeland Security should ensure that research on HDEVs is both comprehensive and responsive as HDEV technology becomes more integrated into the transportation system. Further coordination with safety organizations like FSRI and lessons-learned from data collection from NERIS should help drive this research.[20]

IV. Future Opportunities for Collaboration to Implement Safe EV Transport of Hazmat

The emergence of heavy-duty electric vehicles represents a significant evolution in the nation's freight transportation system. The available evidence demonstrates that EV fire risks have been often mischaracterized: EV fires occur less frequently than ICE vehicle fires and, when they do occur, present hazards that are broadly comparable in severity and increasingly well understood.

At the same time, ZETA supports PHMSA's efforts to identify and address remaining knowledge gaps, particularly in heavy-duty applications and hazmat transport. By grounding regulatory decisions in empirical data, leveraging existing training infrastructure, supporting targeted research, and continuing engagement with the EV industry, PHMSA can ensure that the deployment of heavy-duty EVs proceeds safely and effectively, to the benefit of the American consumer.

ZETA stands ready to work with PHMSA and other federal partners to support this objective.

Sincerely,

Albert Gore
Executive Director

[20] *Id.*