



Electric Vehicles & Fire Safety

Challenges & Approaches for First Responder Preparation

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Introduction

How are states preparing first responders for response to electric vehicle fires?

First responders identified challenges presented by electric vehicle fire incidents in a recent nationwide survey. This webpage will examine the ways states are responding to the specific public safety challenges presented by hybrid and electric vehicle fires.

Specifically, states and industry are providing training, updated manufacturers' guides, and identification of electric vehicles to help first responders overcome the challenges of encountering electric vehicles in emergent situations. Also,

new technology is becoming available to help firefighters in responding to electrical vehicle fires.

National Survey

Overview

In 2022, researchers from the University of Alabama partnered with the Emergency Responder Safety Institute to conduct a [national survey](#) of first responders to collect feedback on responders' incident management knowledge and training experiences related to electric vehicles and whether there are any organizational and geographic disparities in preparedness.



Their survey received over 1,000 responses and included representation from each state, including Montana. Highlights include:

- At the time of the survey, while 90.0% reported having received responder safety training previously, more than 40% of first responders reported never receiving electric vehicle safety training.
- Geographically, Federal Emergency Management Agency (FEMA) Region 8 - including Montana, North Dakota, South Dakota, Wyoming, Utah, and Colorado – was associated with the highest percentage of those reporting not having received electric vehicle training.

- Survey respondents identified specific areas of challenge and risk in managing electric vehicle incidents, as well as recommendations for improving first responder safety.

Findings & Survey Responses

The following maps shows the percentage of participants from the survey reporting **not** having electric vehicle training in 2020 by FEMA regions. The bottom map shows rates of EV ownership by state for 2022.

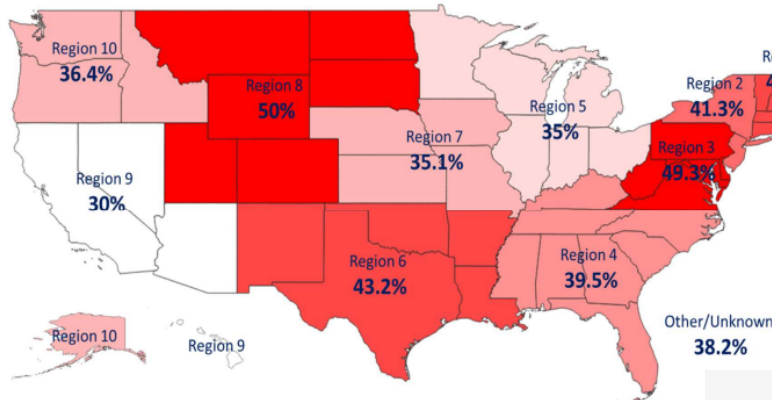
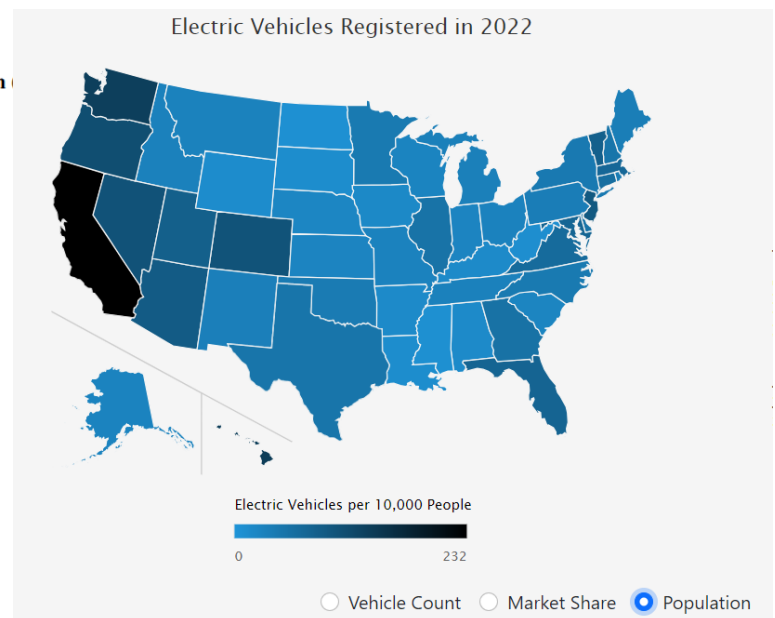


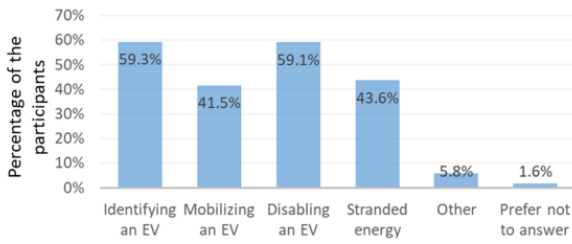
Figure 2: Percentage of participants not receiving EV training by FEMA region



Public Safety Agencies with EV-related training by FEMA Region (2020) & EV Ownership-per-Capita by State (2022)

In comparing the two maps, there is some correlation for states with higher numbers of registered electric vehicles, such as California, and survey responses in FEMA areas where more first responders have taken electric vehicle fire training. A possible challenge, however, is that with interstate travel, electric vehicles registered from any state may be travelling in

areas where greater numbers of first responders report not having received training.

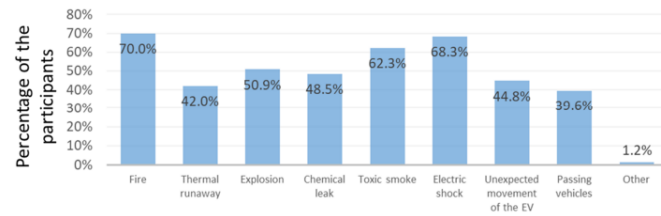


Challenges of responding to EV-related emergencies

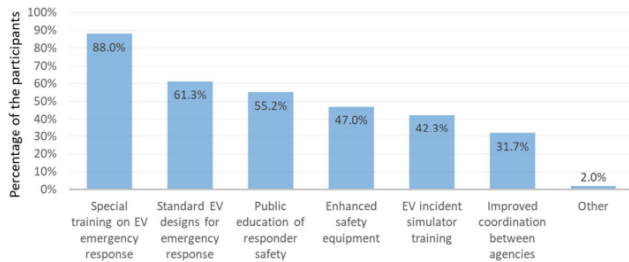
The study also looked at areas of emergency response challenge and risk. Survey results, as shown in the graph to the left, revealed that nearly 60.0% of the survey participants believed that identifying and disabling a vehicle are challenges when

managing electric vehicle-involved incidents.

Survey participants were presented a list of potential risks of managing electric vehicle incidents; the top risk selected was fire, followed by electric shock, and toxic smoke, as shown in the graph to the right.



Potential risks to first responders from EV vehicles



Recommendations for improving first responder safety

In terms of improving responder safety, survey participants identified the recommendations in the chart to the left, with 88.0% of participants selecting special training on electric vehicle emergency response as a recommendation.

Training

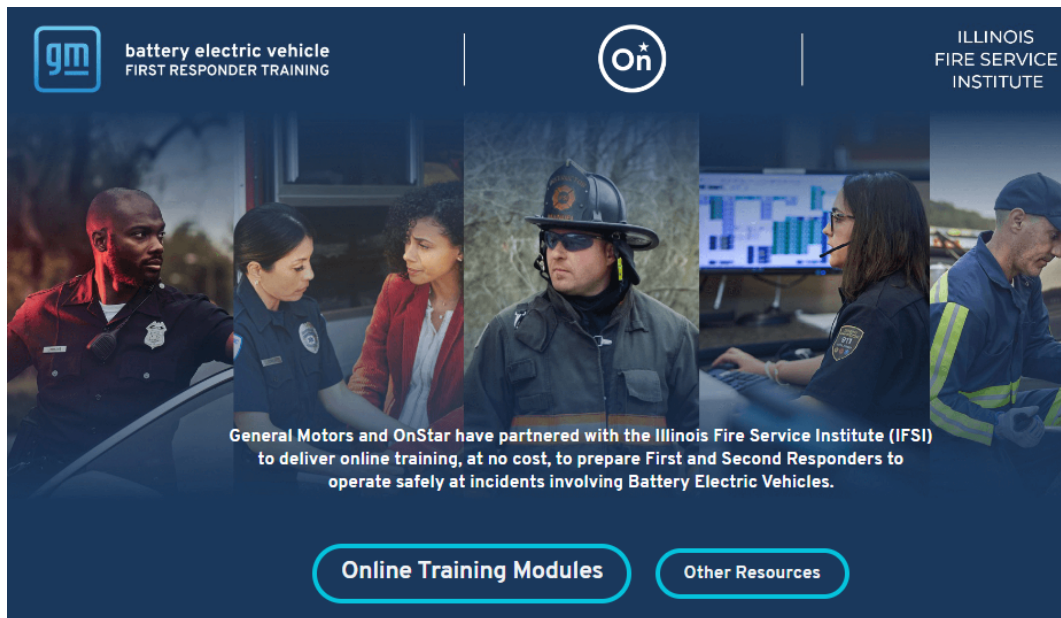
Trainings are increasingly available for first responders to help prepare them for responding to electric vehicle fires. The Alternative Fuels Data Center has a listing of trainings available either online or that can be requested in person.

Electric Vehicle Safety Training Resource...

The U.S. Department of Energy's Vehicle Technologies Office provides project assistance...

https://afdc.energy.gov/vehicles/electric_responders.html

Some of these are offered by national organizations, and some auto manufacturers have begun to offer online training as well.



Some states offer training through the National Fire Protection Association.

In February 2024, Texas A&M Engineering Extension Service (TEEX) released no-cost online training for first responders to "identify the issues, challenges, and current practices in preventing, preparing for, and addressing electric vehicle (EV) and energy storage system (ESS) fires and related emergencies."

In Montana, the Montana State University's (MSU) Fire Service Training School has begun incorporating electric vehicle considerations into their fire and vehicle rescue training. The

MSU Fire Service Training School is authorized in statute, under Title 20, Chapter 31, MCA, to provide fire service personnel with professional training, to provide a resource center for use by local fire services, and to coordinate fire services training in the state. According to the school's webpage, they serve all of Montana's fire departments, companies, and districts, which include an estimated 11,000 members in 467 fire companies, 96.0% of which are volunteers.



Response Guides

To help first responders working with various types of electric vehicles, both the National Fire Protection Association and the Energy Security Agency have developed freely accessible online libraries of electric vehicle emergency response guides provided by manufacturers. These guides provide schematics of the various vehicle makes and models, including battery location.

Emergency Response Guides - Energy Se...

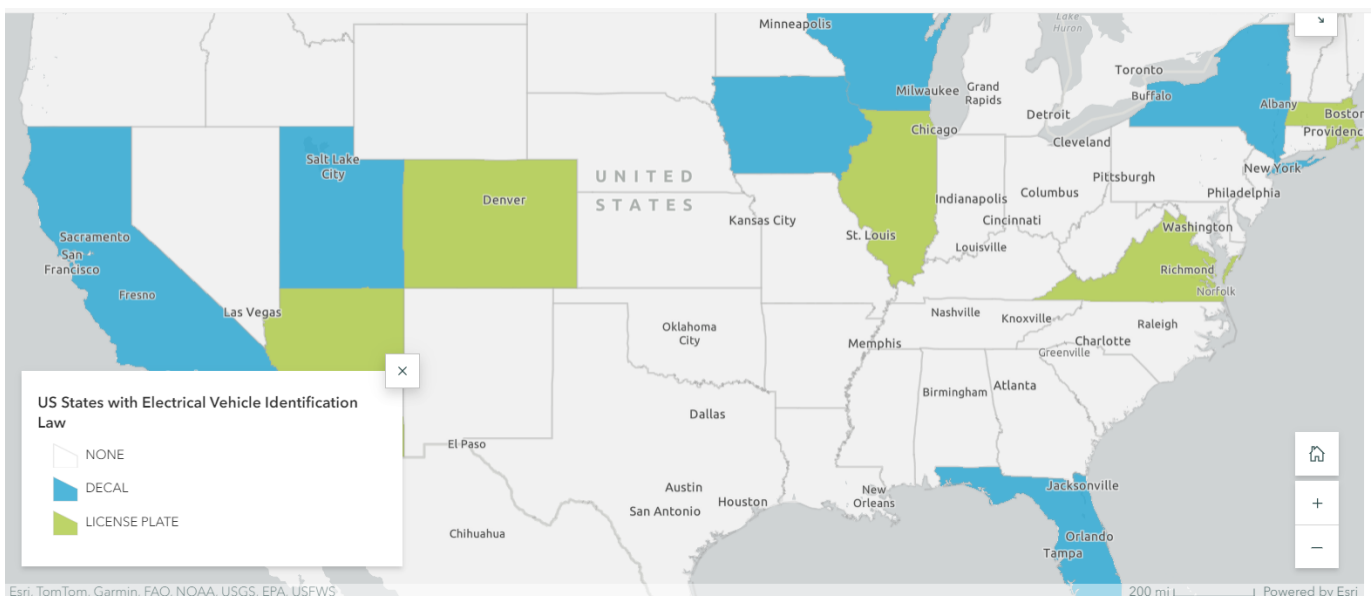
Energy Security Agency houses the most extensive library of Electric and Hybrid Electric Vehicle...

<https://energysecurityagency.com/erg/>

Phone applications are also available, providing emergency response guides with vehicle specific features such as battery location, lifting and stabilization points, location of high voltage cables, and location of high voltage disconnects or cable cut areas. Some applications may require a subscription fee.

Electric Vehicle Identification Aids

Twelve states enacted legislation to offer or require either decals or special license plates to allow for identification of electric and/or hybrid vehicles. For more information, the National Conference of State Legislatures (NCSL) has provided an overview of the legislation in these states.



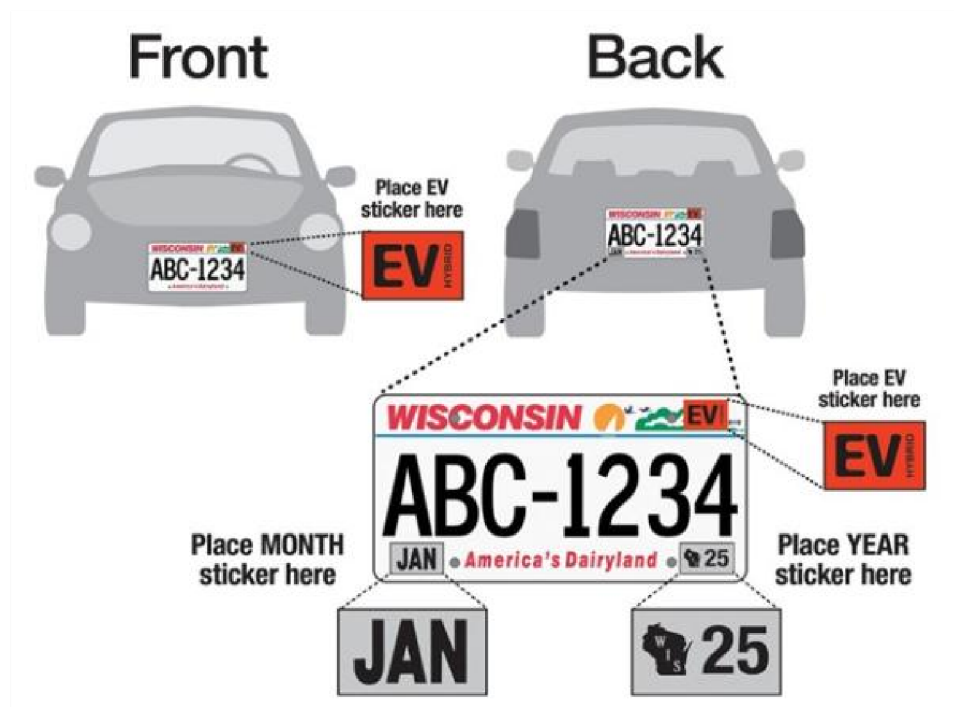
Esri, TomTom, Garmin, FAO, NOAA, USGS, EPA, US...

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States with EV Identification Laws

The intent behind the identification may vary by state. Many of the states use the special stickers or license plates primarily as a way to confer benefits for the drivers of electric vehicles, particularly use of high-occupancy vehicle (HOV) lanes; they can, as a secondary benefit, however, help first responders to identify the vehicles.

Two states recently have considered legislation to require identifying stickers for the primary purpose of aiding first responders in identification of electric and hybrid vehicles; these include Wisconsin and New Jersey. New Jersey's legislation failed to pass, but Wisconsin enacted SB 70/Act 19 in 2023, which requires decals for electric and hybrid vehicle identification. As of February 2024, the Wisconsin Department of Transportation will soon begin sending the new decals to current owners of electric and hybrid vehicles; they'll be black and orange and are to be attached to the license plate, as shown below.



Wisconsin Department of Transportation EV/HEV Decals

New Technology

As electric vehicles become more common, so are efforts to help firefighters manage the challenges posed by electric vehicle fires through technology.

One challenge of electric vehicle fires is the batteries are often underneath the vehicle; to address that, a new system has been developed that attaches to the firehose, almost like a sprinkler, and can then be slid underneath the vehicle to apply the water directly to the battery cell. The advantage is that once deployed, the system operates unmanned, which can reduce exposure to the fire and to any toxic fumes.

A similar system recently developed can be slid underneath the electric vehicle; it then pierces the battery pack and injects water directly inside the battery, which can theoretically reduce the amount of water needed, since the inside of the battery is addressed rather than just the outside.



New Technology to Address Electric Vehicle Fires

Additionally, fire blankets are a tool used for different types of fires; there are fire blankets that are specifically designed for electric vehicles to help when fires are detected. Instead of using water, the blanket is unfolded and covers the car to suppress the oxygen going to the fire to put it out.

These tools may help increase first responder safety in managing electric vehicle fires. They are becoming

increasingly available on the market, with costs varying based on the complexity of the system.

Additional Resources

- [Transportation Interim Committee, Montana Legislature, 2023 - 2024.](#)
- [Are first responders prepared for electric vehicle fires? A national survey, June Liu et al. Accident Analysis & Prevention, Volume 179, January 2023.](#)
- [Electric Vehicle Safety Training Resources for First and Second Responders, Alternative Fuels Data Center.](#)
- [Emergency Response Guides, National Fire Protection Association.](#)
- [Emergency Response Guides, Energy Security Agency.](#)
- [Electric Vehicle \(EV\) and Alternative Fuel Vehicle \(AVF\) License Plate Requirements, National Conference of State Legislatures \(NCSL\).](#)
- [Electric Vehicle Battery Extinguishing System Technology, City of Mountain View, California.](#)

Contributors

Maps

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