



# Electric Vehicle Incidents

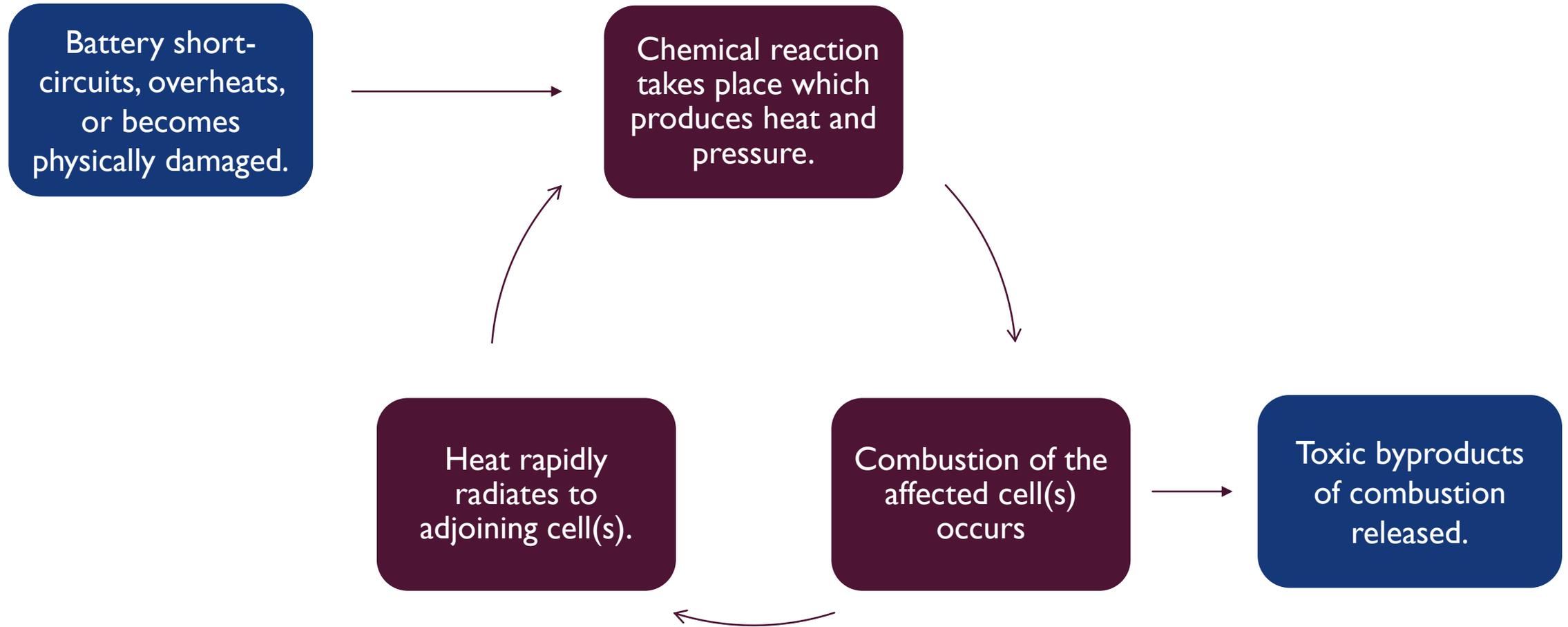
Information and Resources for First Responders

## About Electric Vehicles

- Typically divided in to two segments
- As of June 2021, there were 1,019,000+ BEVs registered in the US.
- Currently 24 EVs on the market today.
- Current BEV/HEV typically use Lithium-Ion batteries. But Lithium-Sulfur batteries are poised to enter the market.

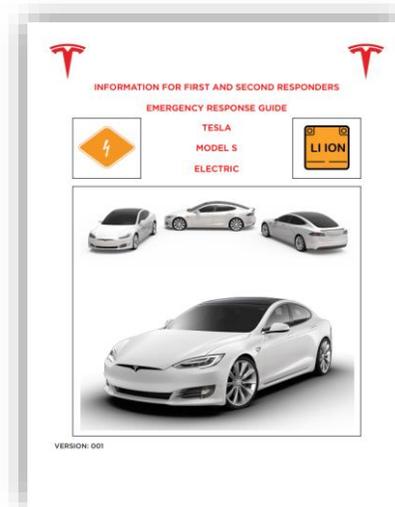
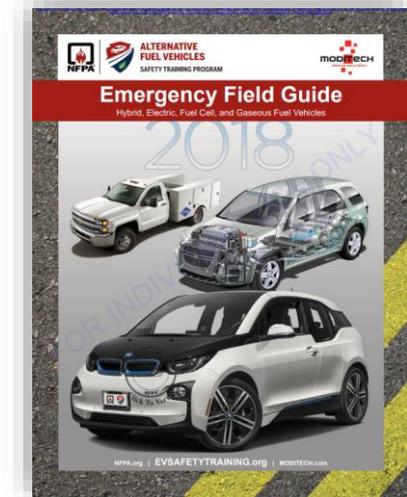
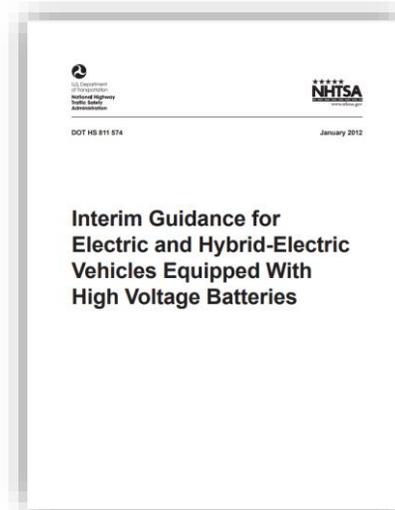


## The Process of Thermal Runaway



## Guidance

- The National Highway Traffic Safety Administration (NHTSA) interim guidance.
- The National Fire Protection Association (NFPA) issued the Electric Vehicle Emergency Field Guide.
- Manufacturer and model-specific guidance



## General Guidance for Responding to EV Incidents

- EV fires will require a large and sustained amount of water to extinguish and cool the battery pack.
- Use full PPE with SCBA if damage to battery is suspected.
- Always assume the high voltage battery is energized.
- Use existing openings/damage to apply extinguishing agent into the battery casing.
- Thermal imaging of the extinguished vehicle is recommended.



# Understand the Challenges

2017-18

**VEHICLE INFORMATION** **Li-ion**  
See pages 15, 22

**IMMOBILIZE VEHICLE**

1. Check the wheels.
2. Set parking brake. (push-button on the end of the gearshift)
3. Place vehicle into park. (completed in step 2)

**DISABLE VEHICLE**

**PRIMARY PROCEDURE**

1. Open the hood:
  - 12V enabled: Touch the associated OPEN button on the dash touchscreen.
  - 12V disabled: Release the tow eye cover from front bumper, pull two wires out, then connect 12V power to terminals.
2. Remove the access panel by pulling it up to release the clips securing it.
3. Double cut the first responder loop to remove an entire section (engine compartment, driver's side).

**ALTERNATE PROCEDURE**  
(Only if hood is inaccessible)

1. Use a saw or rescue tool and cut 6 inches (15 cm) through the rear pillar, under passenger's rear fixed glass.

**WARNINGS**

- ⚠ NEVER cut, breach, or touch high voltage components or cabling. Doing so could result in serious injury or death.
- ⚠ High voltage cables and components may remain energized for up to 2 minutes after disabling.
- ⚠ Airbags and SRS may remain powered for up to 10 seconds after disabling.
- ⚠ In the event of a fire involving a charging station, reference the FIRE portion of this guide, and treat it as an energized electrical fire until power to the charger can be shut down.
- ⚠ This vehicle does not have an internal combustion engine. Lack of engine noise does not mean vehicle is OFF. Silent movement capability exists until vehicle is fully shut down.

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**Li-ion** (continued) **EXTRICATION INFORMATION**  
See pages 15, 22

**LEGEND**

Airbag	Bodywork Reinforcements	SRS Control Unit
Stored Gas Inflator	Support Cylinder for Hood	12V Battery
Seatbelt Tensioner or Pretensioner		High-Voltage Power Cable
High-Voltage Battery	Emergency Disconnect (Cut Cable)	

For towing and post-incident instructions, see the POST-INCIDENT section on page 20.

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- Identification of BEV/HEV
- Immobilization
- Vehicle areas which present cutting dangers
- On-board fuel types

## Recovery of Vehicles with Damaged Batteries

- Reignition Considerations
- Vehicle recovery operations can trigger reignition.
- Reignition can occur hours-to-days after the initial fire.

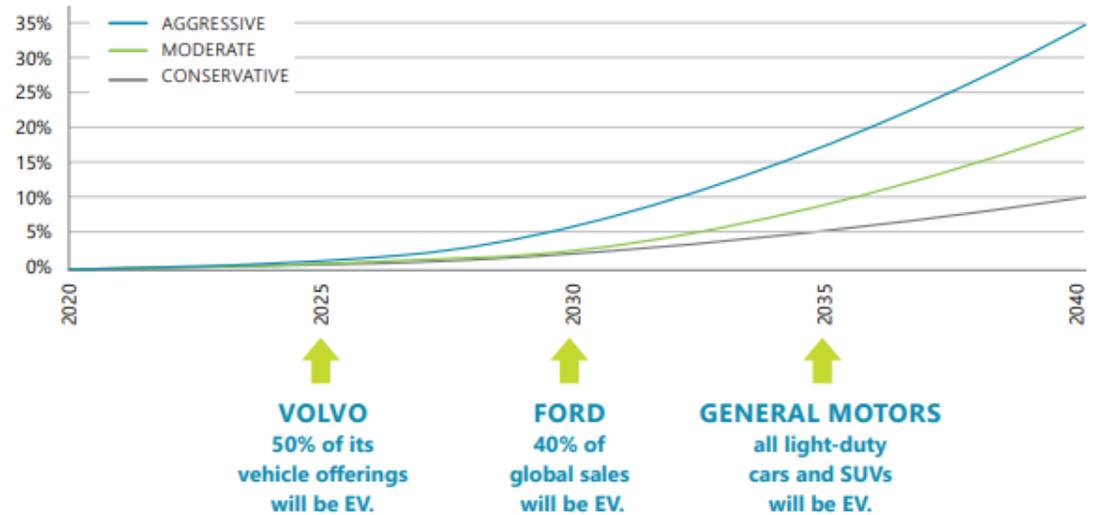


# EV Market & Adoption

- Many domestic and import automakers have committed to improving EV offerings.
- A 10%-35% market adoption of EVs is expected by 2040.

<p><b>AGGRESSIVE</b> Growth accelerates and continues for some time at a high rate due to reductions in cost, rapid technological improvements, and bold policy or funding incentives.</p>	<p><b>MODERATE</b> Growth occurs at an even pace with continued price decreases, technology improvements and modest policy or funding incentives.</p>	<p><b>CONSERVATIVE</b> Growth is limited due to factors such as cost, technological innovation pace and existing policy.</p>
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**EV Market Adoption Projections of LD Vehicles by Scenario**



# EV Adoption in Florida

## FDOT EV Master Plan

### SUPPORT

short-range and long-range electric vehicle travel as well as emergency evacuation in the state

### ADAPT

state highway infrastructure consistent with market demand

### ENSURE

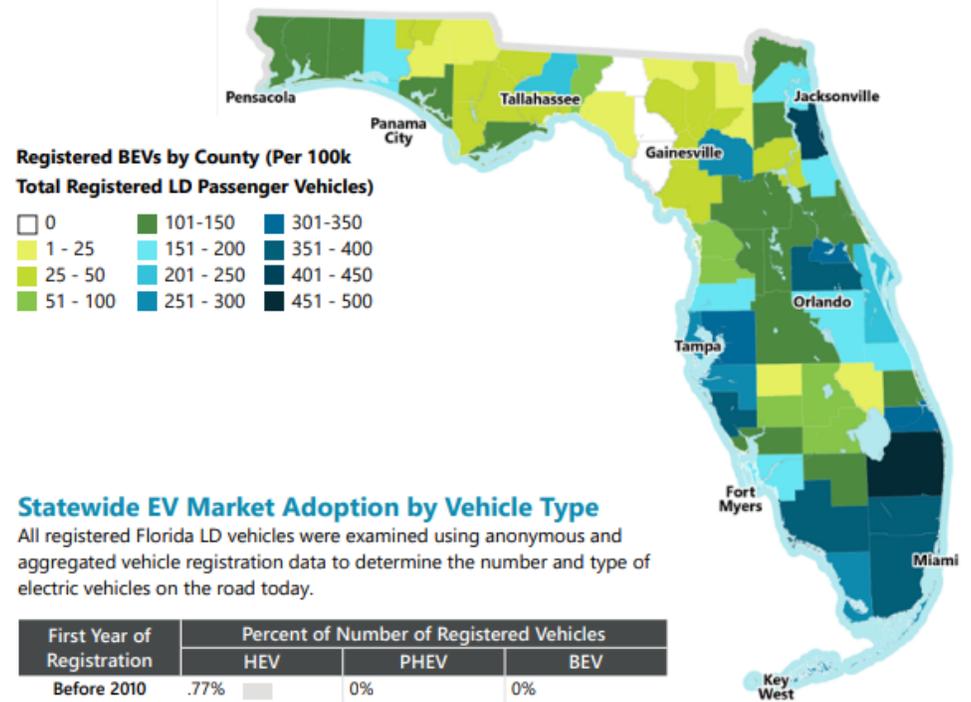
availability of adequate and reliable EV charging stations

## EV Charging Infrastructure Development and Deployment

## EV MARKET ADOPTION

Increasing EV sales is a precursor to actual EV market adoption. In Florida, annual EV sales have remained below two percent of overall vehicle sales and are projected to grow.

### BEV Ownership by County



### Statewide EV Market Adoption by Vehicle Type

All registered Florida LD vehicles were examined using anonymous and aggregated vehicle registration data to determine the number and type of electric vehicles on the road today.

First Year of Registration	Percent of Number of Registered Vehicles		
	HEV	PHEV	BEV
Before 2010	.77%	0%	0%
2010	1.58%	0%	0%
2011	1.72%	.03%	.02%
2012	2.37%	.11%	.04%
2013	2.51%	.11%	.11%

Map Source: Florida Highway Safety and Motor Vehicles (2021); Date of Production: 3/19/2021

## Training for Your Agency

- **National Fire Protection Association** – provides comprehensive training program and documentation on alternative fuel vehicle safety. <https://www.nfpa.org/EV>
- **Federal Emergency Management Administration** – “coffee break bulletin” with short points on attacking EV fires. <https://www.usfa.fema.gov/blog/cb-061819.html>
- **National Alternative Fuels Training Consortium** – offers a full catalog of training opportunities. <https://naftc.wvu.edu/>
- **Manufacturers of EV/HEV Vehicles** – have been called upon by national agencies to assist emergency responders with information on response to incidents involving their products. Check specific manufacturer websites.



## Working with the TMC on Electric Vehicle Incidents

- FDOT District 1 TMCs are committed to ensuring responder safety by providing any information we can gather to responding agencies and coordinating with said agencies on closures.
- Augment your agency's situational awareness by subscribing to the FDOT District 1 IVDS video sharing platform and gaining access to our real-time camera feeds. (Service provided at no charge by FDOT. Contact [Robbie.Brown@dot.state.fl.us](mailto:Robbie.Brown@dot.state.fl.us) for more information)
- Leverage the power of the TMC by contacting us 24/7/365 with interstate and state road/US Highway incidents in the 12-county SW Florida area | 239-225-1960.
- Partner with us on experiential learning opportunities for your team and see first-hand how the TMCs can help your agency.