

# Nationwide Trends of Battery Electric Vehicle Crashes

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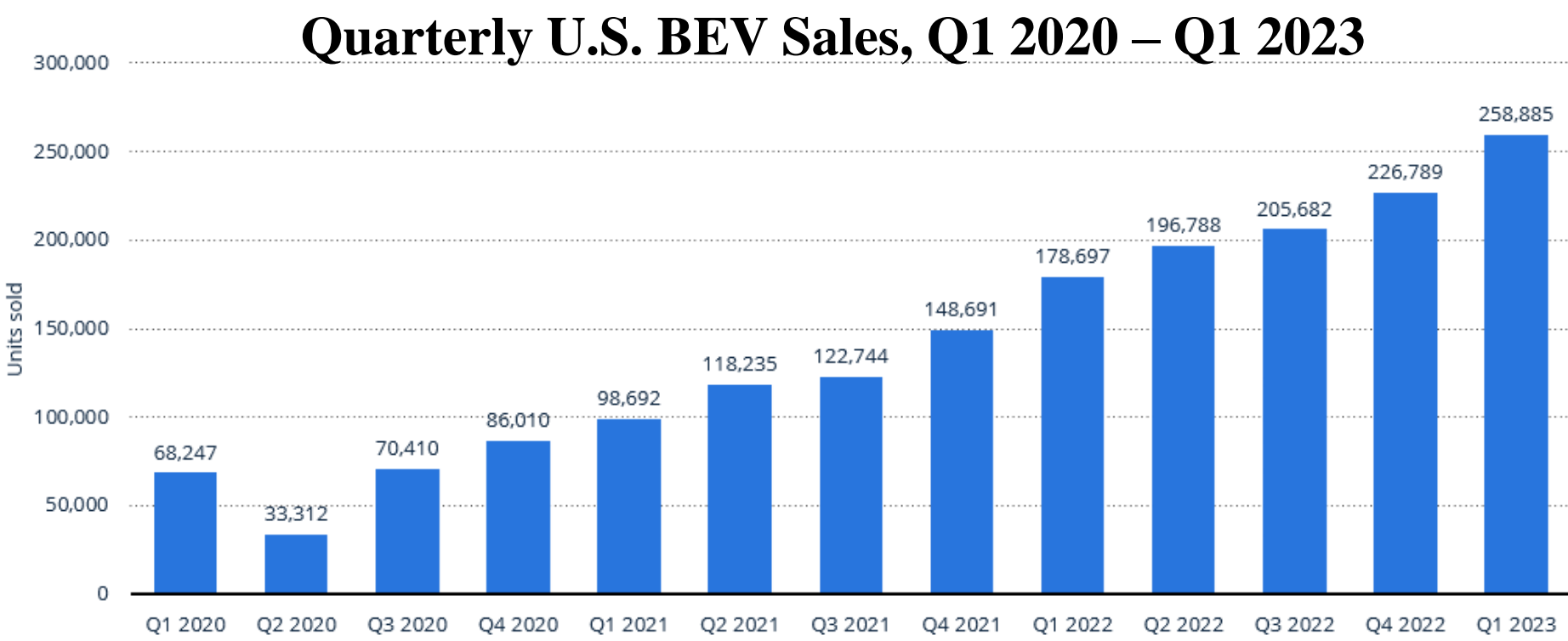


## Objective

- Identify differences in crash characteristics between Battery Electric Vehicles and both Hybrid Electric and Internal Combustion Engine Vehicles across multiple states to analyze national trends.

## Background

- BEV sales increased dramatically due to consumer demand and accelerated with tax and finance incentives.

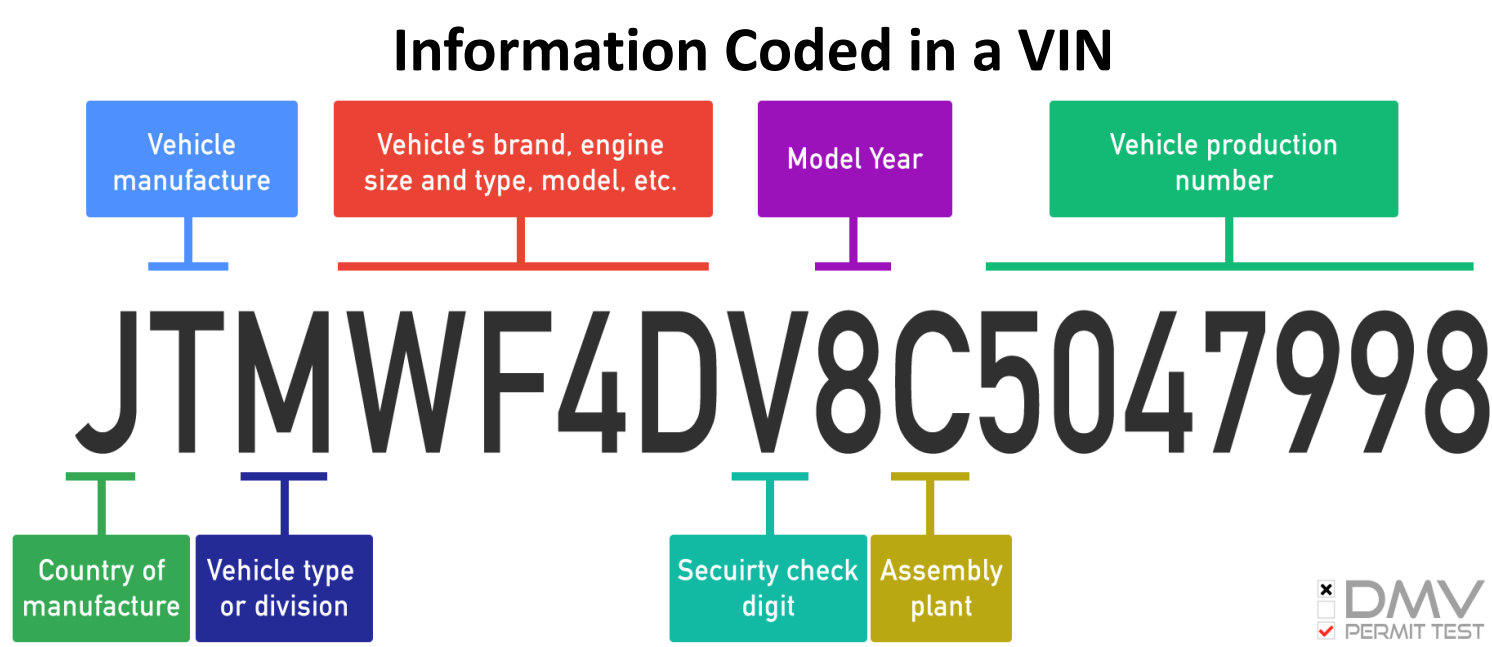


- Many new EV brands and models produced, but safety performance during crashes is unclear.
- BEVs are 20 to 50% heavier than ICEV counterparts for the same vehicle size.
- An EV versus ICEV fire is more severe and more difficult to extinguish because "It can create its own oxygen, [meaning] it can sustain its own fire and get bigger and actually have multiple explosions as it burns, so we've got to be cautious, too." – Lt. Chris Swenson of the South Portland Fire Department.
- DOTs do not currently track if a crash involves an EV.

## Method

- To retrieve EV Class, VINs were decoded using NHTSA's VIN decoder tool. Using the decoder also ensured vehicle make, model, body style, and year were correct on crash reports.

Acronym	Meaning
DOT	Department of Transportation
BEV	Battery Electric Vehicle
HEV	Hybrid Electric Vehicle
ICEV	Internal Combustion Engine Vehicle
VIN	Vehicle Identification Number
NHTSA	National Highway Traffic Safety Administration



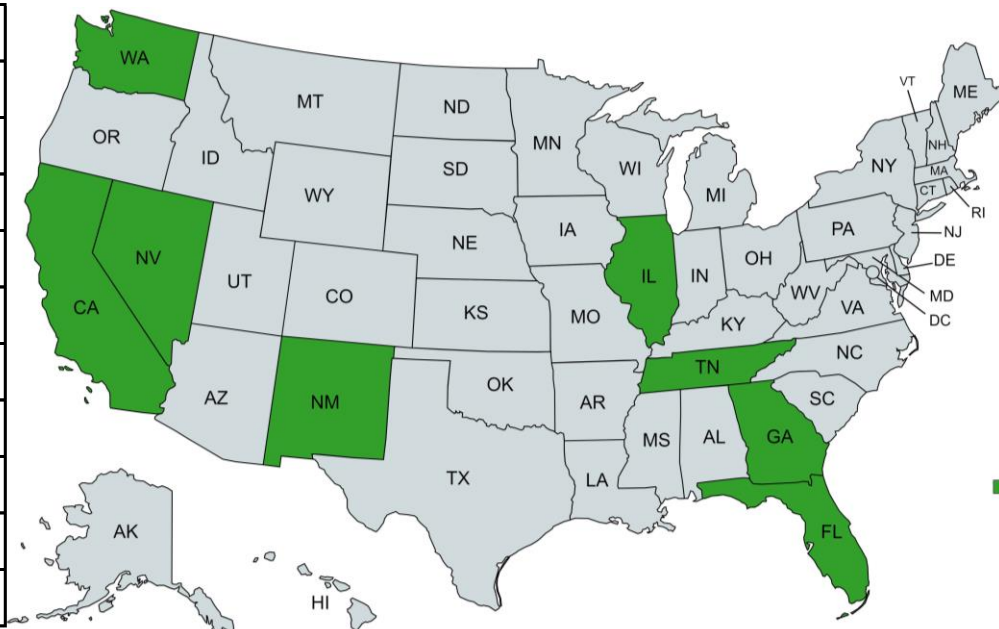
- Only vehicles produced since 2010 were considered.

## Results

- Crash data was received from Washington, New Mexico, Florida, California, Tennessee, Illinois, Georgia\*, and Nevada. Total number of crashes in the reports received was 10.6 million crashes.  
\*only Tesla Crashes

**Number of Crashes In Received Reports**

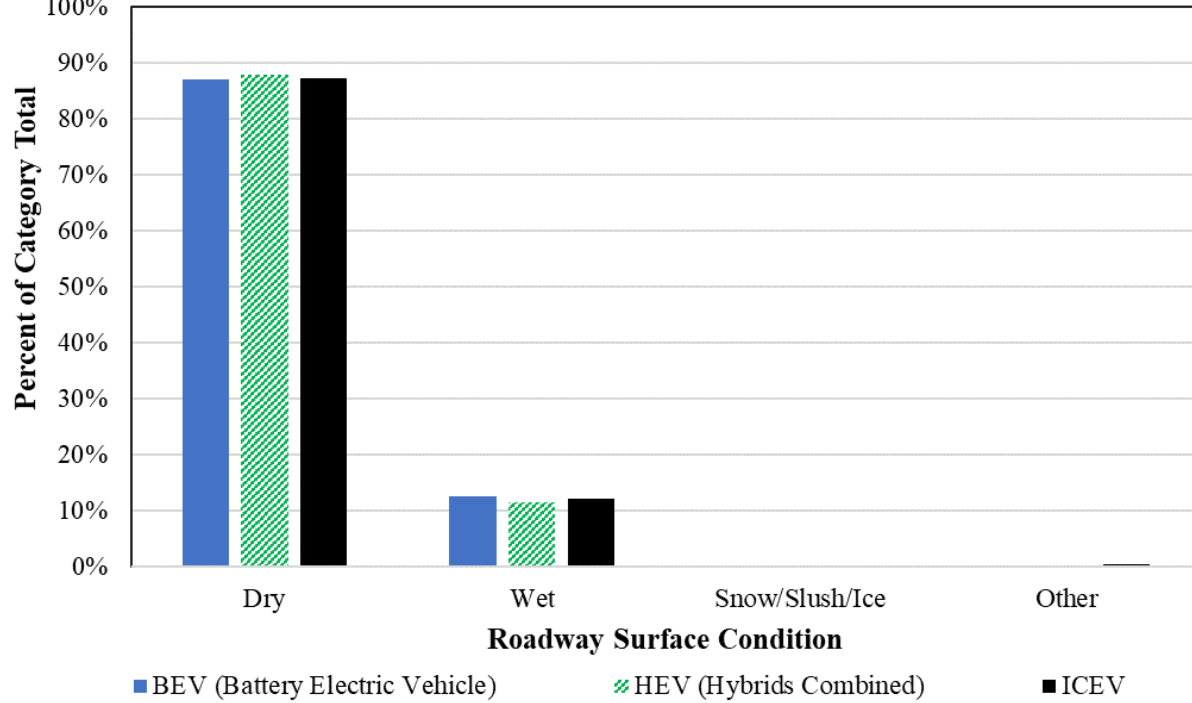
State	2016 & prior	2017	2018	2019	2020	2021	Total
Washington	-	127,158	122,043	117,545	90,685	108,305	565,736
New Mexico	45,071	45,906	46,786	48,124	36,555	39,722	262,164
Florida	-	730,801	739,616	743,676	589,467	709,017	3,512,577
California	-	486,425	482,275	470,548	367,408	407,675	2,214,331
Tennessee	1,102,089	247,104	247,671	247,384	210,830	235,959	2,291,037
Illinois	324,498	312,010	319,216	313,781	247,407	-	1,516,912
Georgia	66	104	214	390	418	1,123	2,315
Nevada	93,672	54,014	52,457	53,818	-	-	253,961
GRAND TOTAL							10,619,033



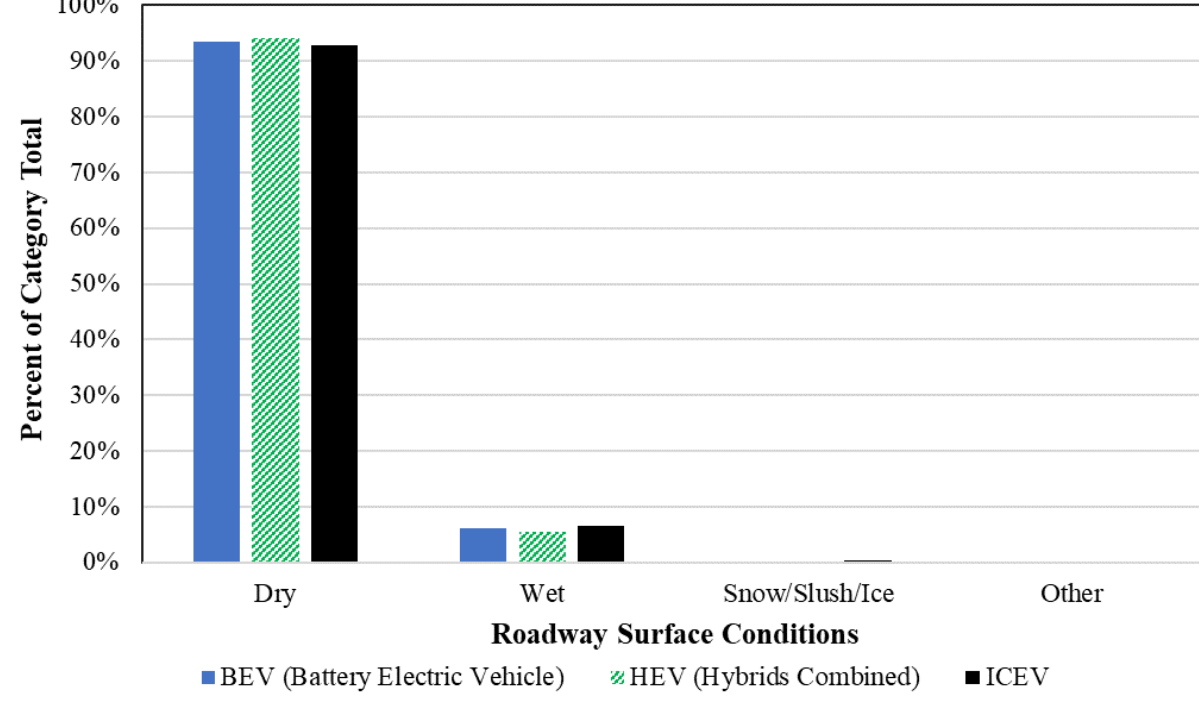
**% of Total Filtered Data**

State	Filtered Data %	BEV	HEV	ICEV	Unknown
Washington	61.54%	0.98%	7.10%	91.64%	0.28%
New Mexico	65.64%	0.13%	2.24%	96.01%	1.62%
Florida	71.30%	0.35%	2.66%	96.98%	0.01%
California	69.32%	0.81%	1.70%	22.68%	74.81%

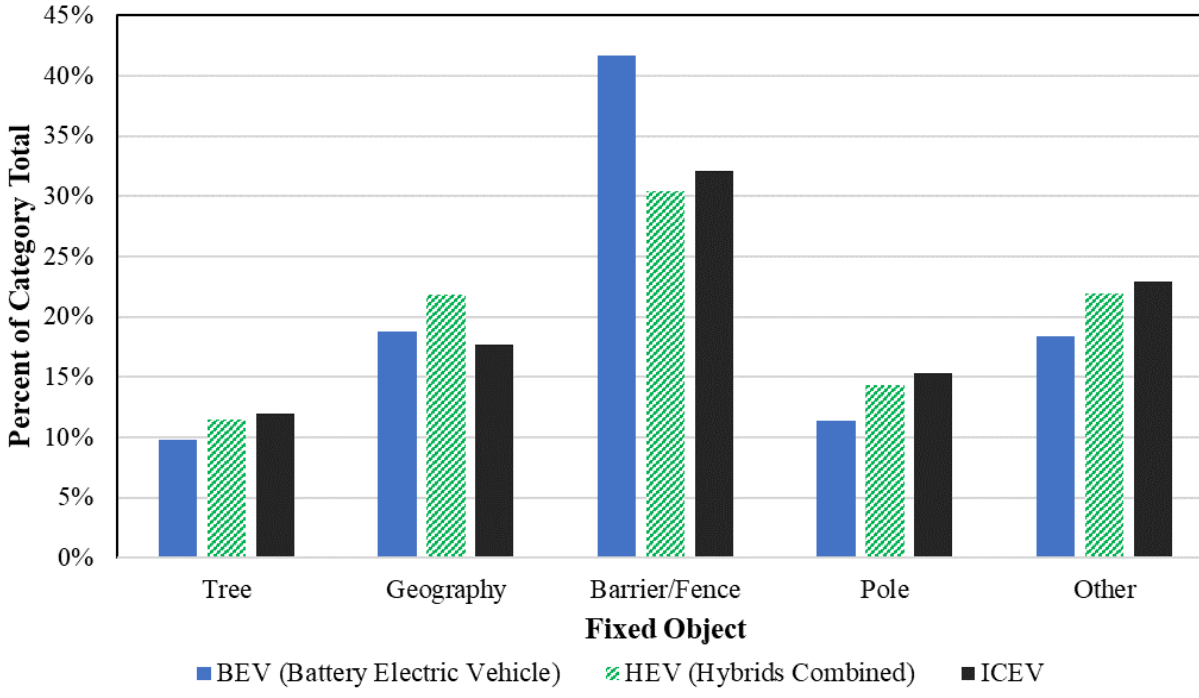
**FL - Roadway Surface Conditions**



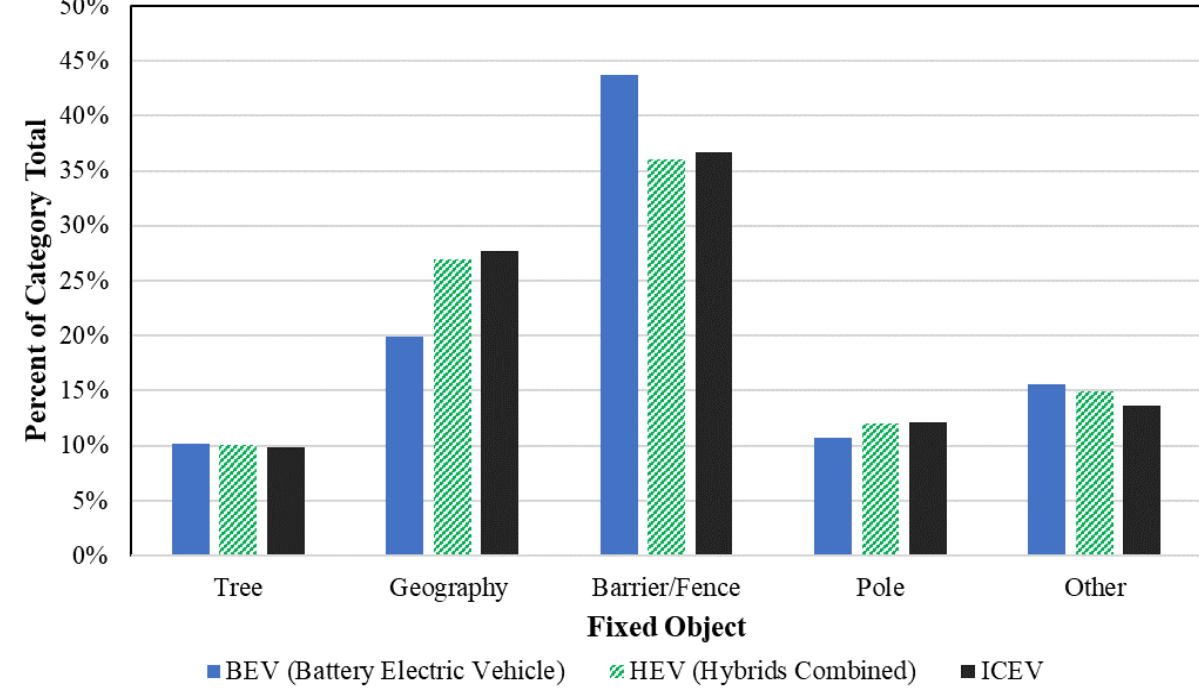
**CA - Roadway Surface Conditions**



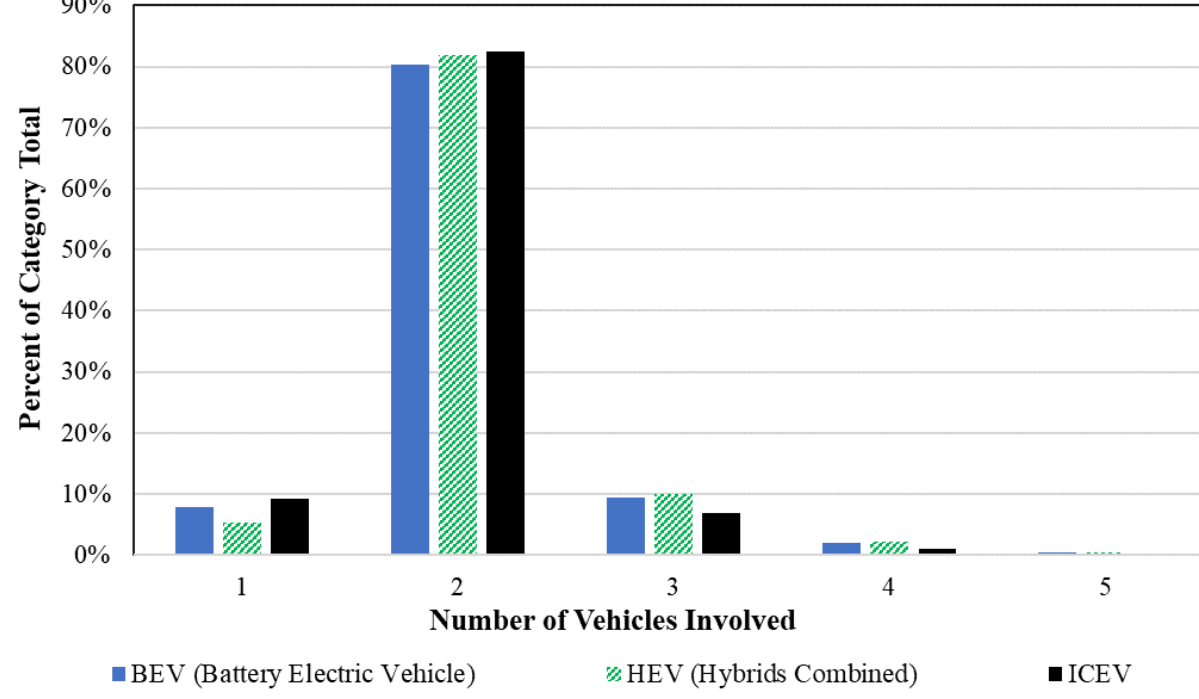
**FL - Known Fixed Objects Struck**



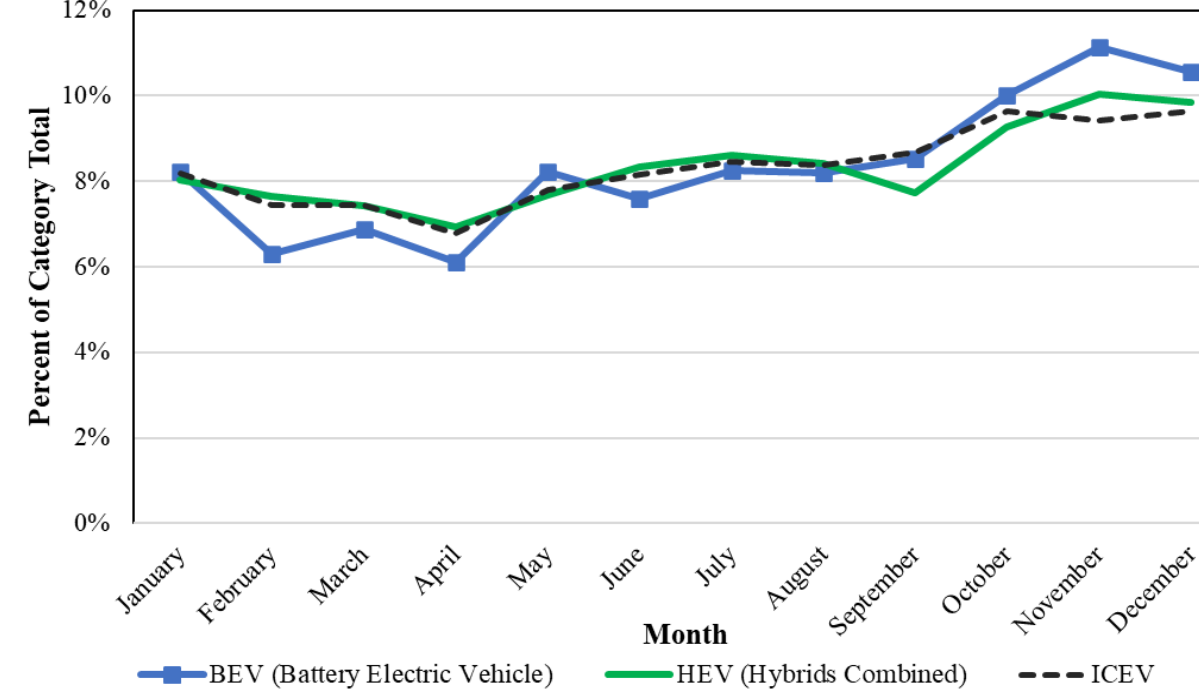
**WA - Known Fixed Objects Struck**



**FL - Numbers of Vehicles Involved in Crash**



**WA - Crashes by Month**

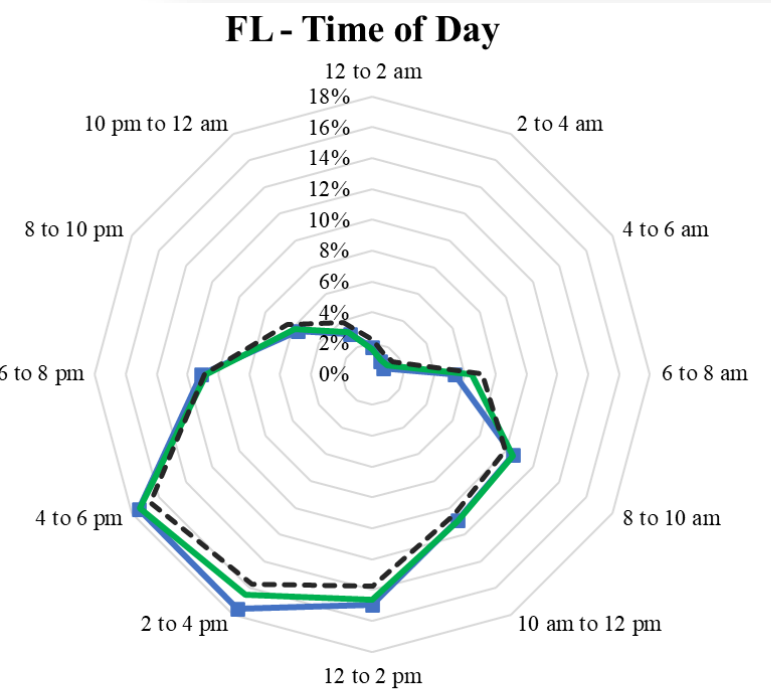


Sources: - "Quarterly U.S. BEV Sales, Q1 2020 – Q1 2023" from Statista "Electric vehicles in the United States"  
- "Information Coded in a VIN" from DMV Permit Test "What is a VIN Number?"  
- Map created with mapchart.net  
- Quote in Background from News Center Maine "Are EVs more likely to catch fire than gas-powered cars?"  
- BEV weight in Background from MWRSF "Electric Vehicles and Roadside Safety"

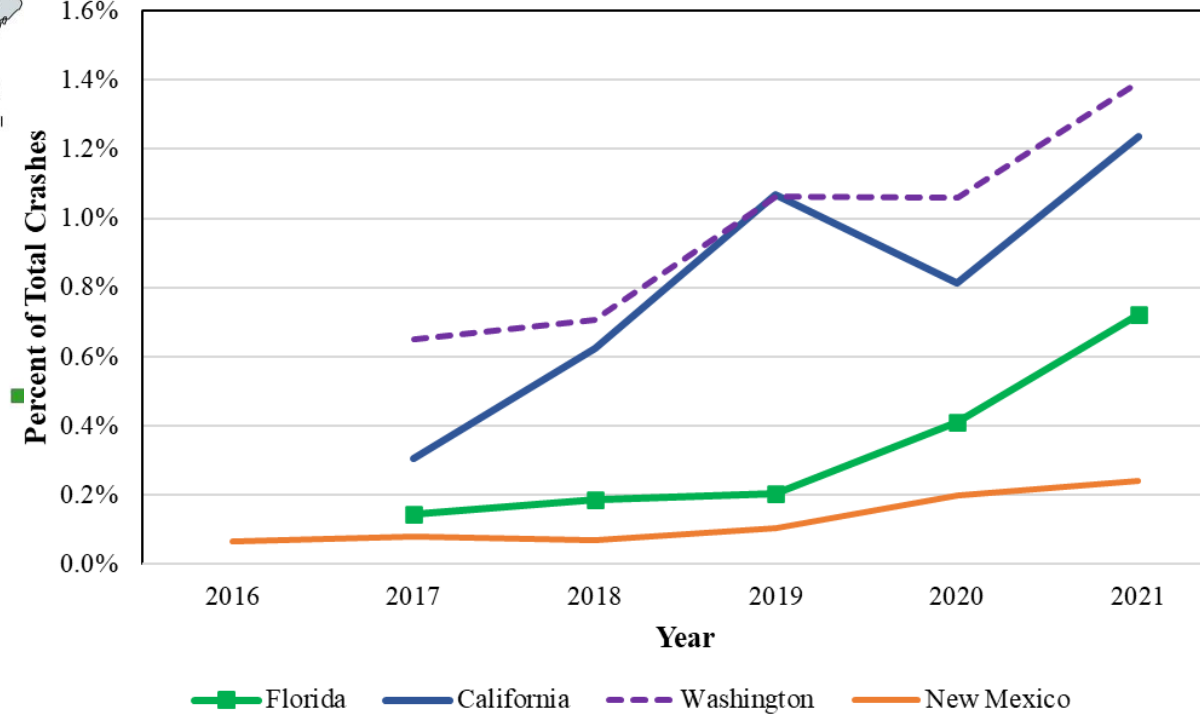
## Results

**Percent of Crashes Involving Fire**

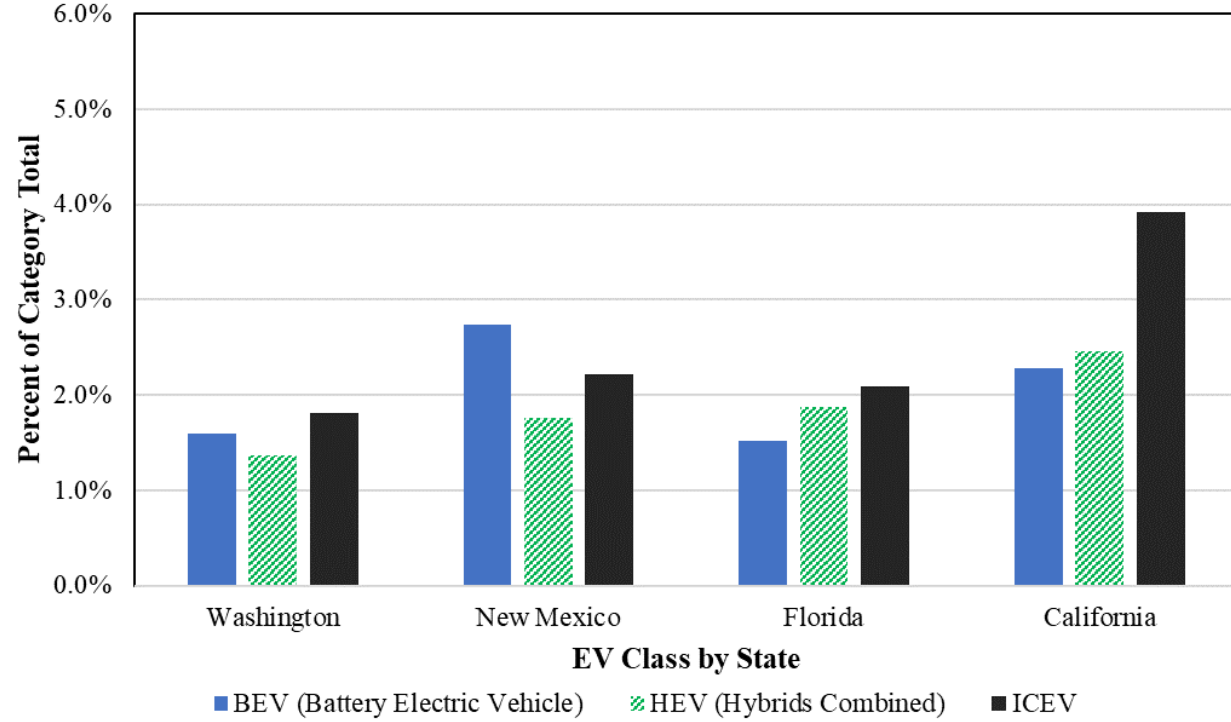
State	EV Class		
	BEV	HEV	ICEV
Florida	0.03%	0.03%	0.04%
Washington	0.29%	0.32%	0.33%



**Percent of Crashes Involving BEVs**



**Percentage of Severe Crashes (K+A)**



## Conclusions

- No statistically-significant difference in crash characteristics or contributing factors between BEVs and ICEVs or HEVs.
- BEVs appear to collide with barriers at a higher rate than ICEVs or HEVs; no barriers have been evaluated for EVs.
- BEV sales will likely increase, and more BEV crashes associated with a higher volume of vehicles may occur.
- As heavy BEVs increase in volume. there could arise incompatibilities with current transportation infrastructure.
- Although BEV fires are more severe, they are not occurring at higher rates than ICEV fires.

## Acknowledgements

- This work was supported by the Nebraska Public Power District through the Nebraska Center for Energy Sciences Research at the University of Nebraska-Lincoln.
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