

September 24, 2019
FTA Conference



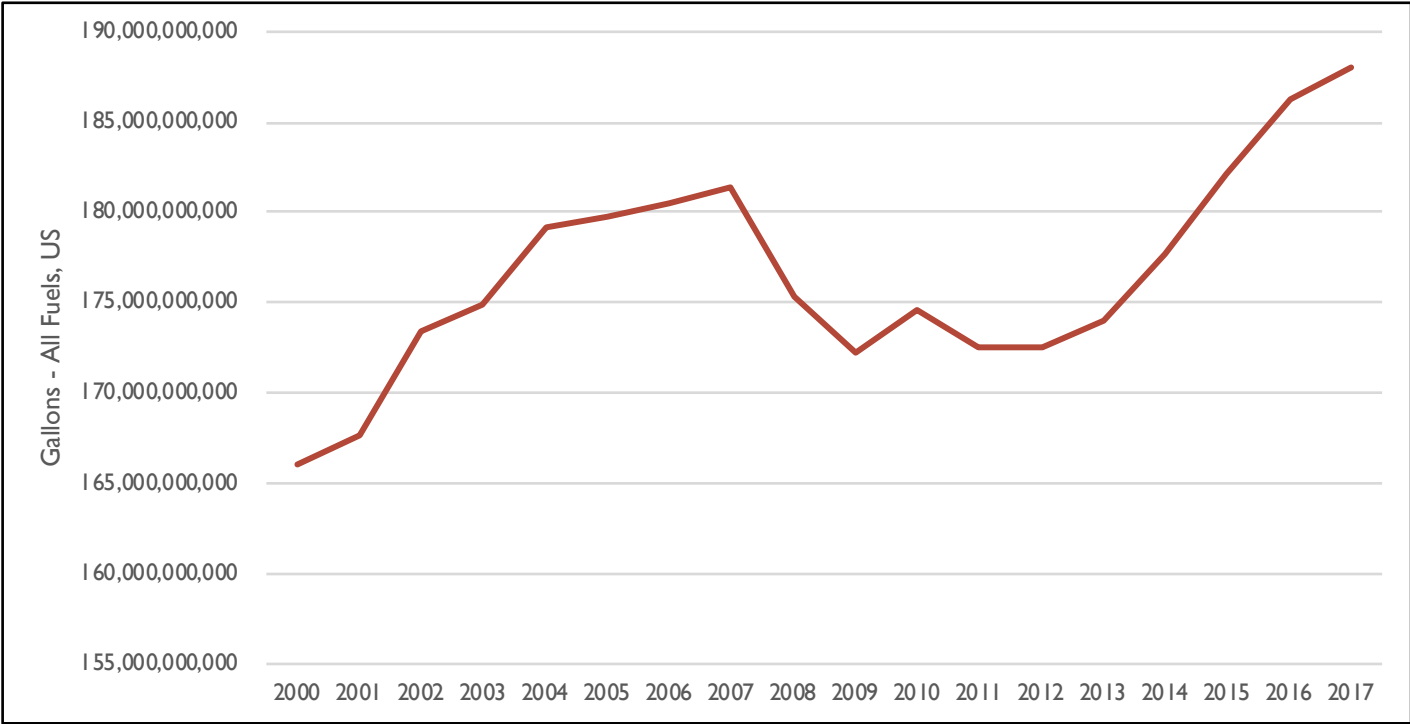
THE
CENTER
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CAUSE FOR CONCERN? THE EFFECT OF ELECTRIC VEHICLES ON STATE MOTOR FUEL RECEIPTS

DRAFT – PRELIMINARY RESULTS

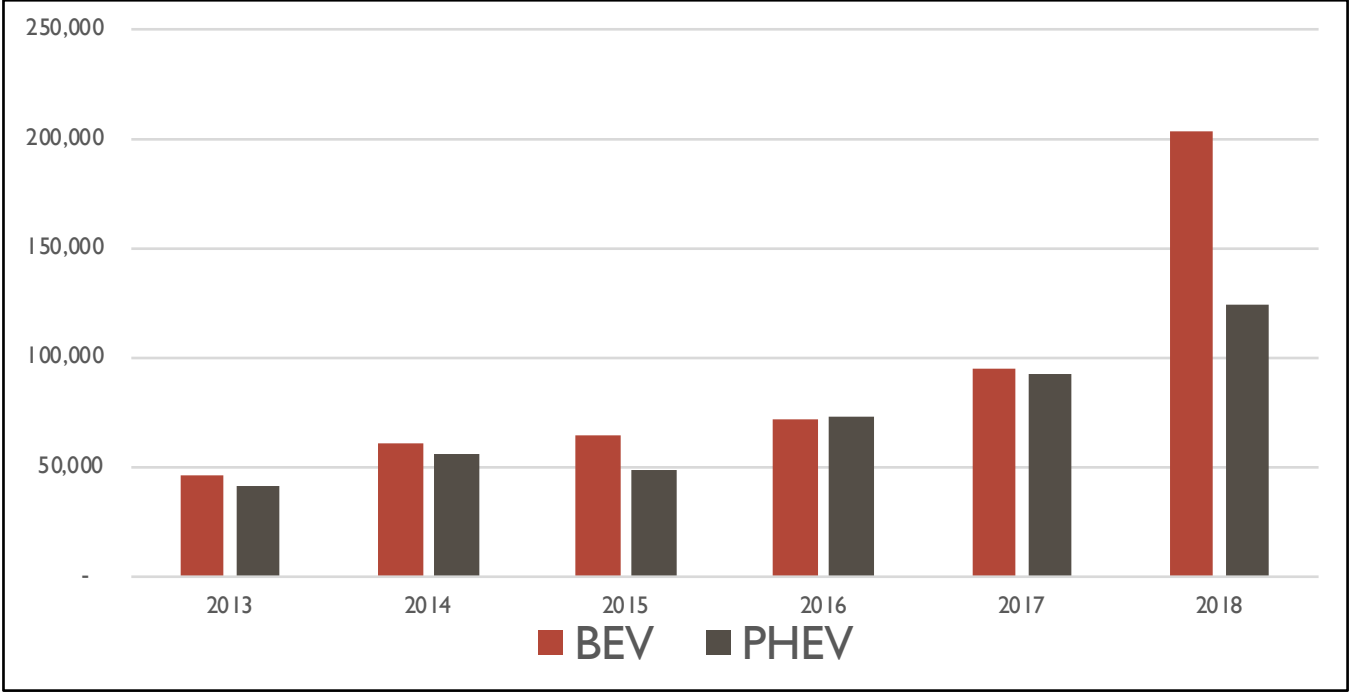
By Laura Wheeler

Total US Motor Fuel Consumption, 2000-2017



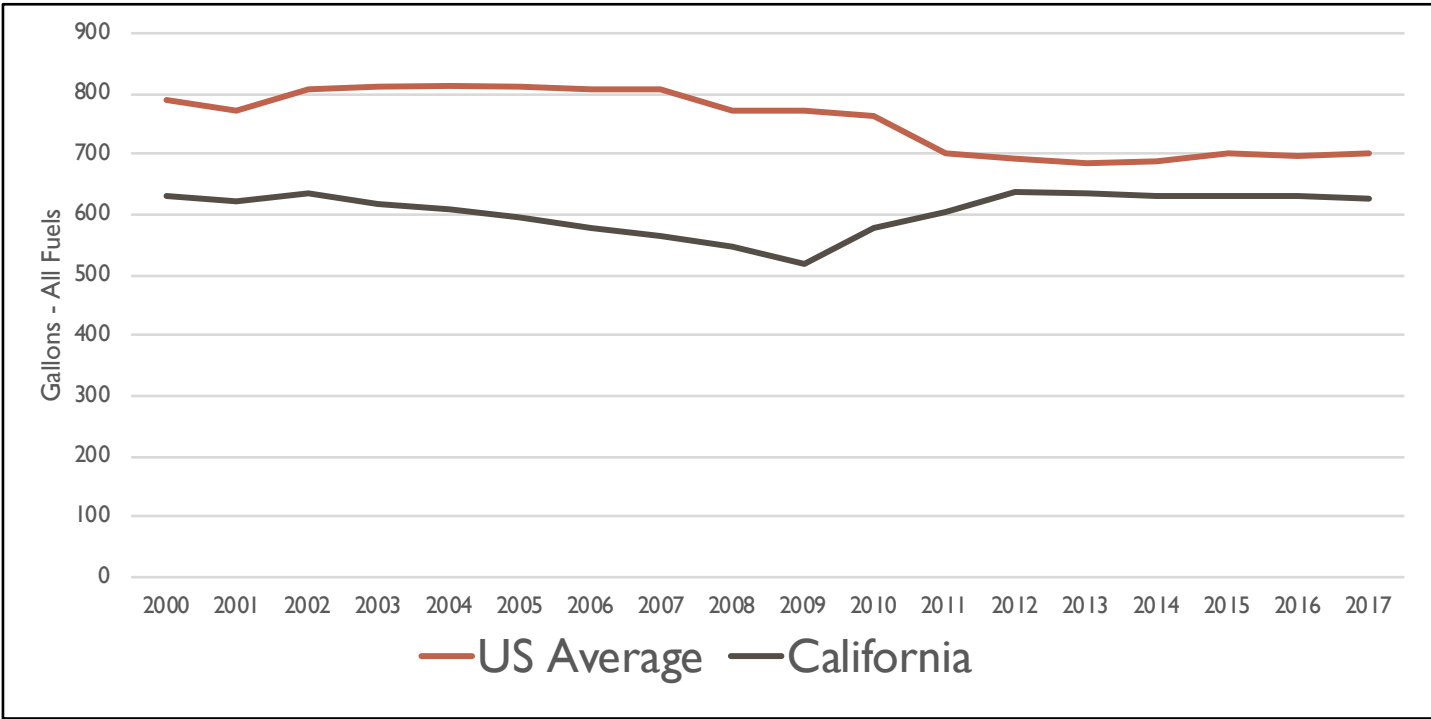
Source: Federal Highway Administration data, Table MF-33GA and Table MF-33SF

Electric Vehicle (BEVs and PHEVs) Sales, 2013-2018



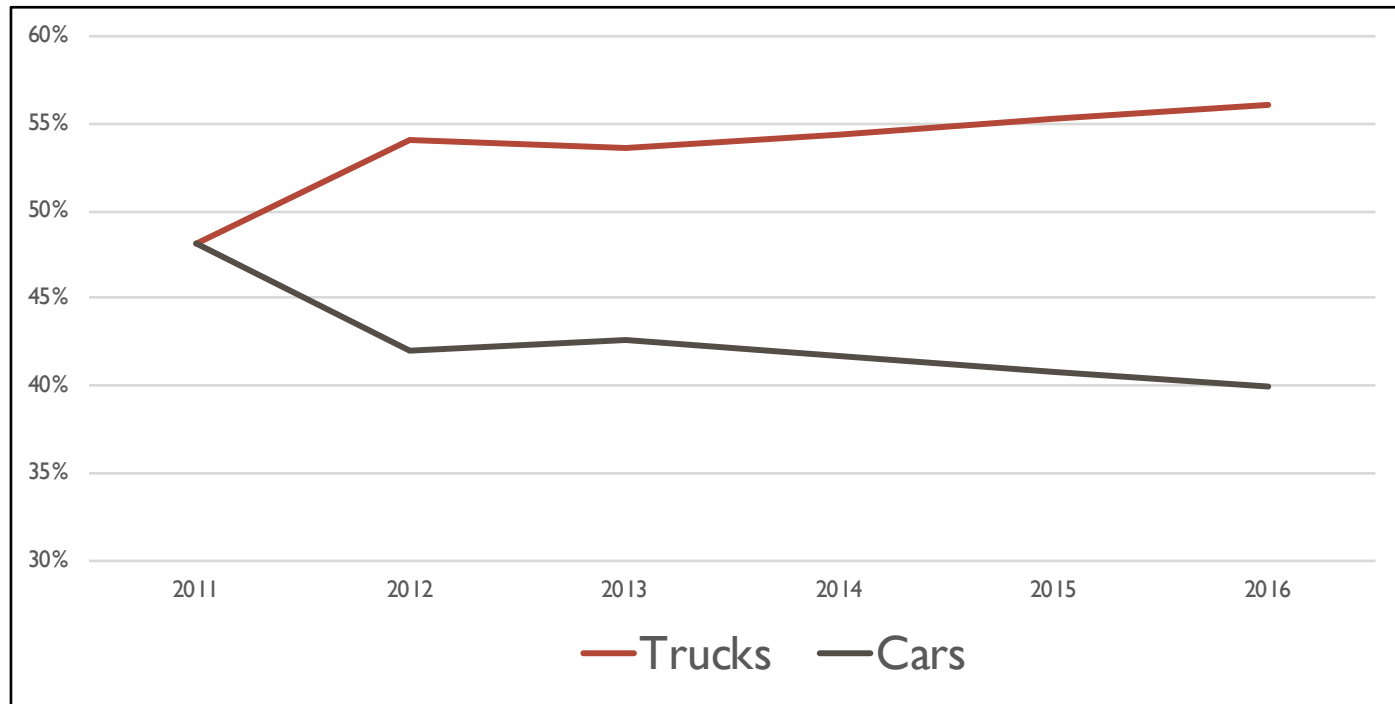
Source: Auto Alliance, U.S. Light-Duty ATV Sales

Average fuel consumption per vehicle, 2000-2017



Source: Federal Highway Administration data, Table MF-33GA and Table MF-33SF

Share of Vehicle Registrations by type, 2011-2016



Source: Federal Highway Administration data, Table MV-1, various years. Other vehicles not classified as trucks or cars are not shown.

Standard Calculation of Effect

Average number of miles traveled per year	13,476
% of miles using conventional fuel (PHEV)	0.45
Average miles per gallon – all vehicles	24.9
Average miles per gallon – Truck/SUV	21.4
Effect from one additional unit, holding total number of vehicles constant	
BEV (annual gallons)	-541
PHEV (annual gallons)	-298
Truck/SUV (annual gallons)	89

Econometric Model

$$MF_i = \beta_0 + \beta_1 EVShare_{i,t} + \beta_2 TruckShare_{i,t} + \beta_3 Z_{i,t} + \varepsilon_i$$

Main Variables	Mean	Min	Max
Gasoline (gallons in millions)	2,714.364	98.983	15,507.69
Special Fuel (gallons in millions)	766.460	15.554	5,329.829
Registration trucks	2,644,175	71,458	1.45e+07
BEV registrations	2,182.105	0	129,202
PHEV registrations	2,291.366	2	123,287
Truck Share (%)	53.601	22.597	71.938
BEV Share (%)	0.026	0	0.428
PHEV Share (%)	0.030	0.0003	0.407951

Model Results – OLS, Levels, All Fuel

VARIABLES	All States		Excl. California	
	(1)	(2)	(3)	(4)
EVs	-0.00458		-0.0346	
	<i>(0.00529)</i>		<i>(0.0266)</i>	
BEVs		0.0124		-0.00632
		<i>(0.0205)</i>		<i>(0.0241)</i>
PHEVs		-0.0227		-0.100**
		<i>(0.0263)</i>		<i>(0.0392)</i>
Truck registrations	0.00137***	0.00137***	0.00143***	0.00145***
	<i>(6.92e-05)</i>	<i>(6.96e-05)</i>	<i>(7.56e-05)</i>	<i>(7.36e-05)</i>

Time dummies are negative and significant

Model Results - OLS, Shares, All Fuel

VARIABLES	All States		Excl. California	
	(1)	(2)	(3)	(4)
EV Share	-452.4		369.4	
	<i>(1,746)</i>		<i>(1,059)</i>	
BEV Share		2,331		2,196
		<i>(1,686)</i>		<i>(1,655)</i>
PHEV Share		-5,036		-4,287*
		<i>(3,323)</i>		<i>(2,344)</i>
Truck Share	19.94	17.98	27.15	23.77
	<i>(14.91)</i>	<i>(14.35)</i>	<i>(18.78)</i>	<i>(19.16)</i>

Time dummies are negative and significant

Model Results - Fixed Effects, Shares, All Fuel

VARIABLES	All States		Excl. California	
	(1)	(2)	(3)	(4)
EV Share	-462.7*		-411.5**	
	(234.4)		(189.9)	
BEV Share		-485.6		-609.5*
		(377.3)		(358.8)
PHEV Share		-433.0		-34.15
		(466.3)		(570.2)
Truck Share	11.25*	11.15	6.878	5.322
	(6.696)	(7.027)	(5.563)	(5.742)

Time dummies are negative and significant

Model Results - Fixed Effects, Shares, Gasoline

VARIABLES	All States		Excl. California	
	(1)	(2)	(3)	(4)
EV Share	-349.5***		-378.1***	
	<i>(128.5)</i>		<i>(124.0)</i>	
BEV Share		-545.1**		-653.0***
		<i>(247.1)</i>		<i>(219.8)</i>
PHEV Share		-93.16		151.4
		<i>(281.2)</i>		<i>(354.1)</i>
Truck Share	6.35	5.46	3.31	1.13
	<i>(4.56)</i>	<i>(4.77)</i>	<i>(3.74)</i>	<i>(3.57)</i>

Time dummies are negative and significant

Model Results - Fixed Effects, Shares, Diesel

VARIABLES	All States		Excl. California	
	(1)	(2)	(3)	(1)
EV Share	-186.8		-116.9	
	<i>(142.3)</i>		<i>(133.8)</i>	
BEV Share		-56.05		-71.85
		<i>(252.9)</i>		<i>(248.5)</i>
PHEV Share		-351.0		-201.0
		<i>(265.9)</i>		<i>(280.7)</i>
Truck Share	6.32**	6.93**	5.16*	5.53*
	<i>(2.88)</i>	<i>(3.03)</i>	<i>(2.65)</i>	<i>(2.82)</i>

Time dummies are negative and significant

Implications

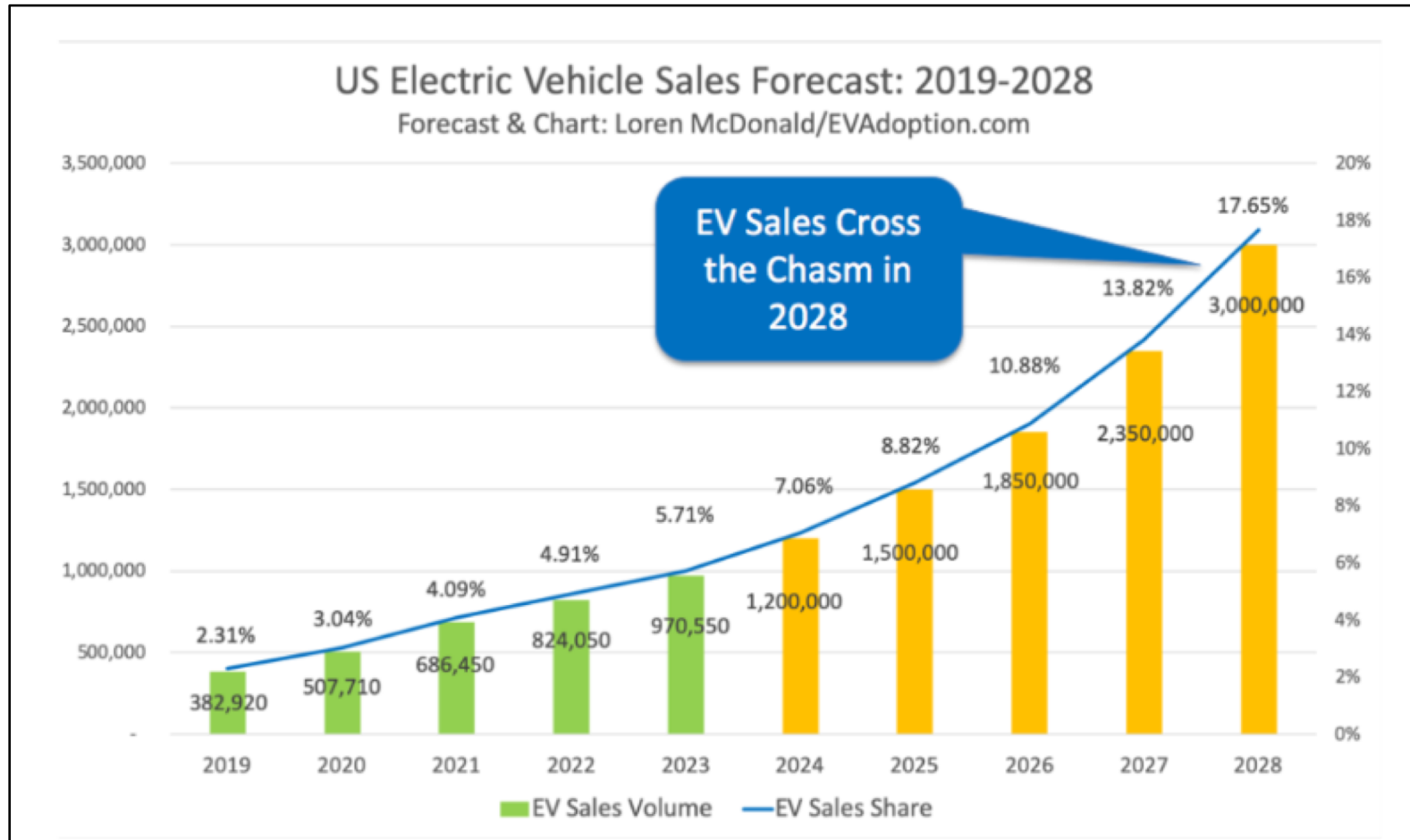
On the positive side -

- Population growth is helping to sustain motor fuel receipts
- Additions to the truck fleet offset the EVs
- Results indicate that marginal effect of EV is less than the average fuel usage
- Adoption may not be as fast as some expect

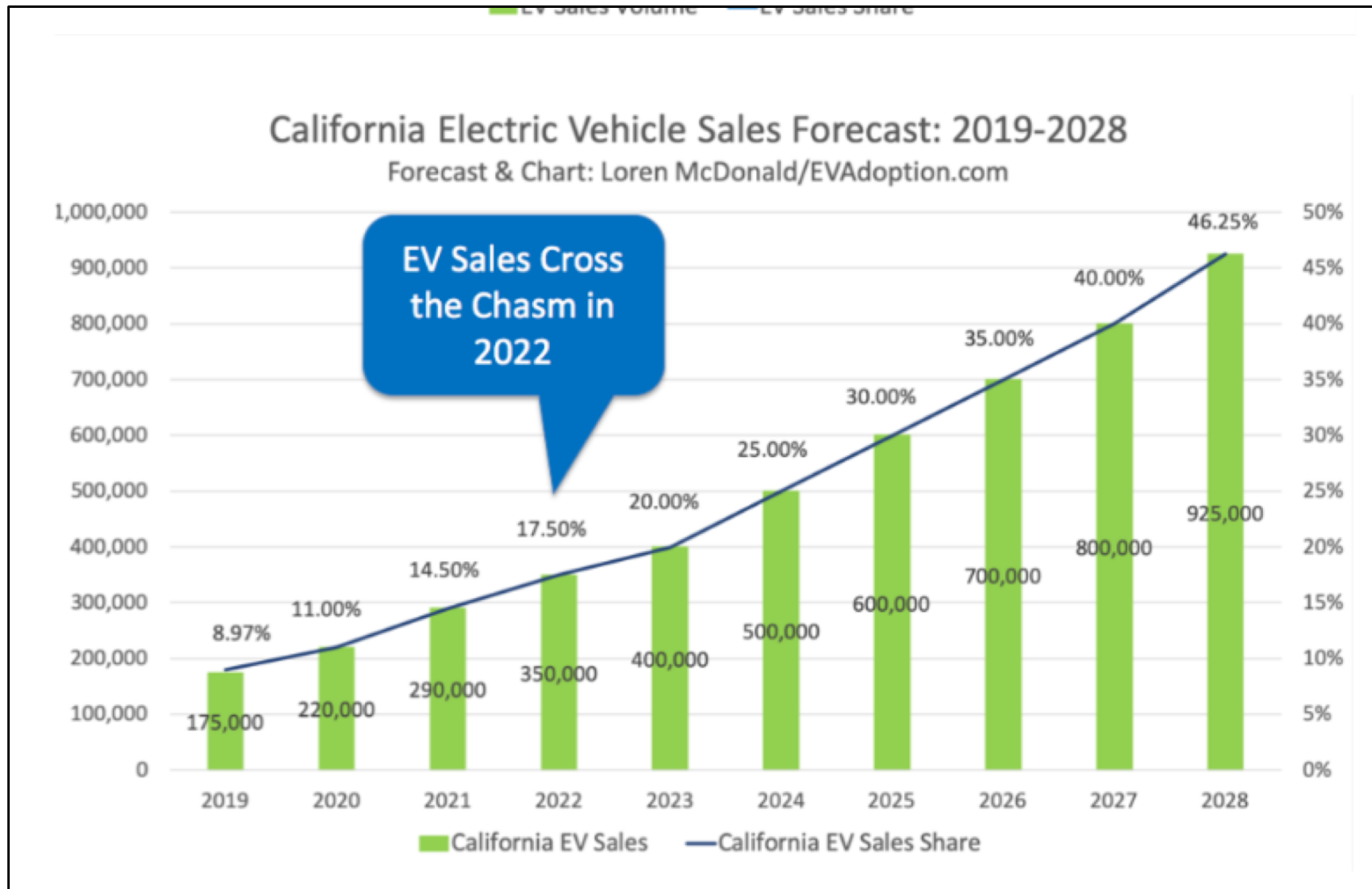
On the negative side -

- General improvement of MPG by fleet is more immediate threat than EVs
- EVs are a real threat

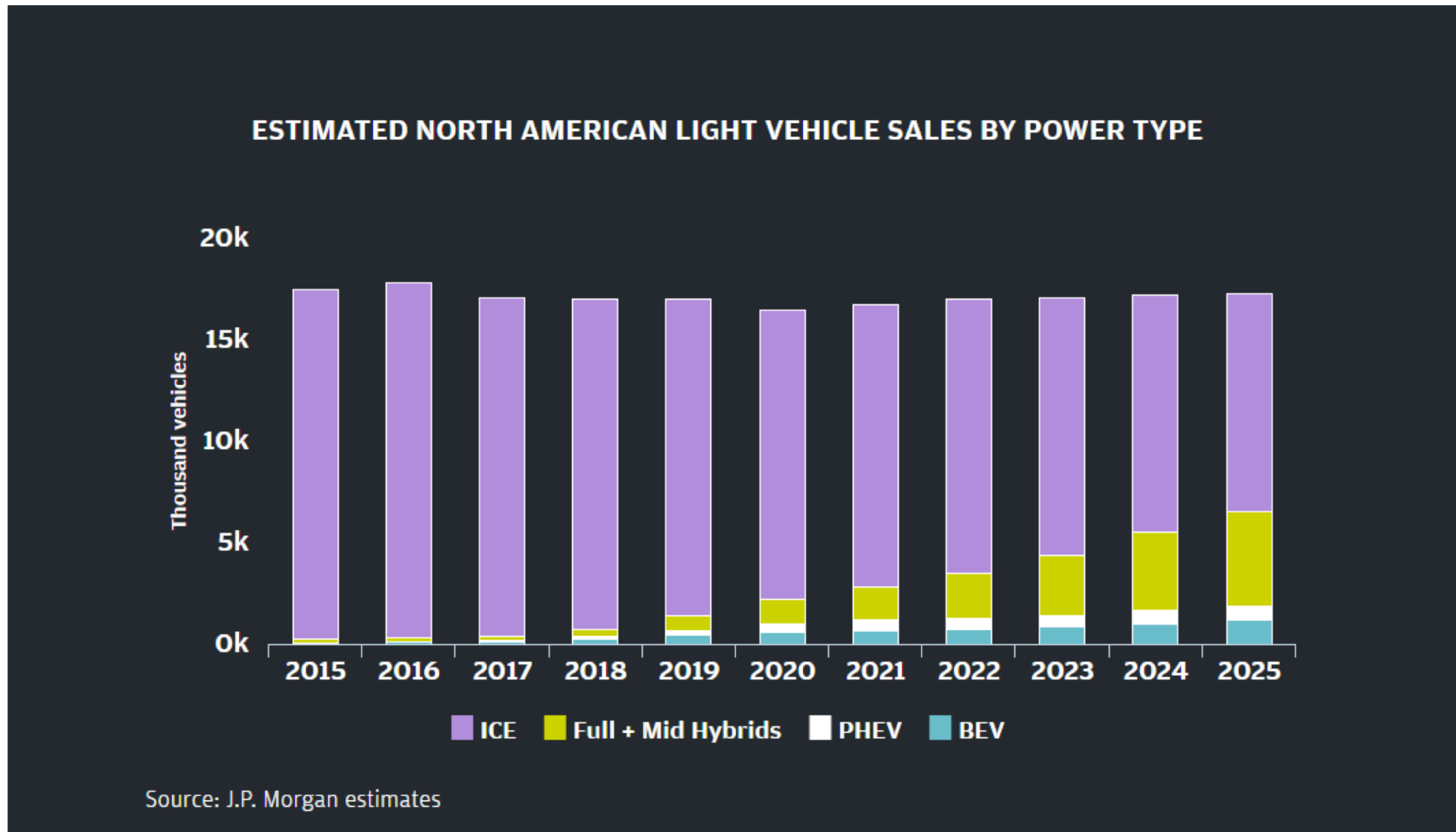
US EV Sales Forecasts



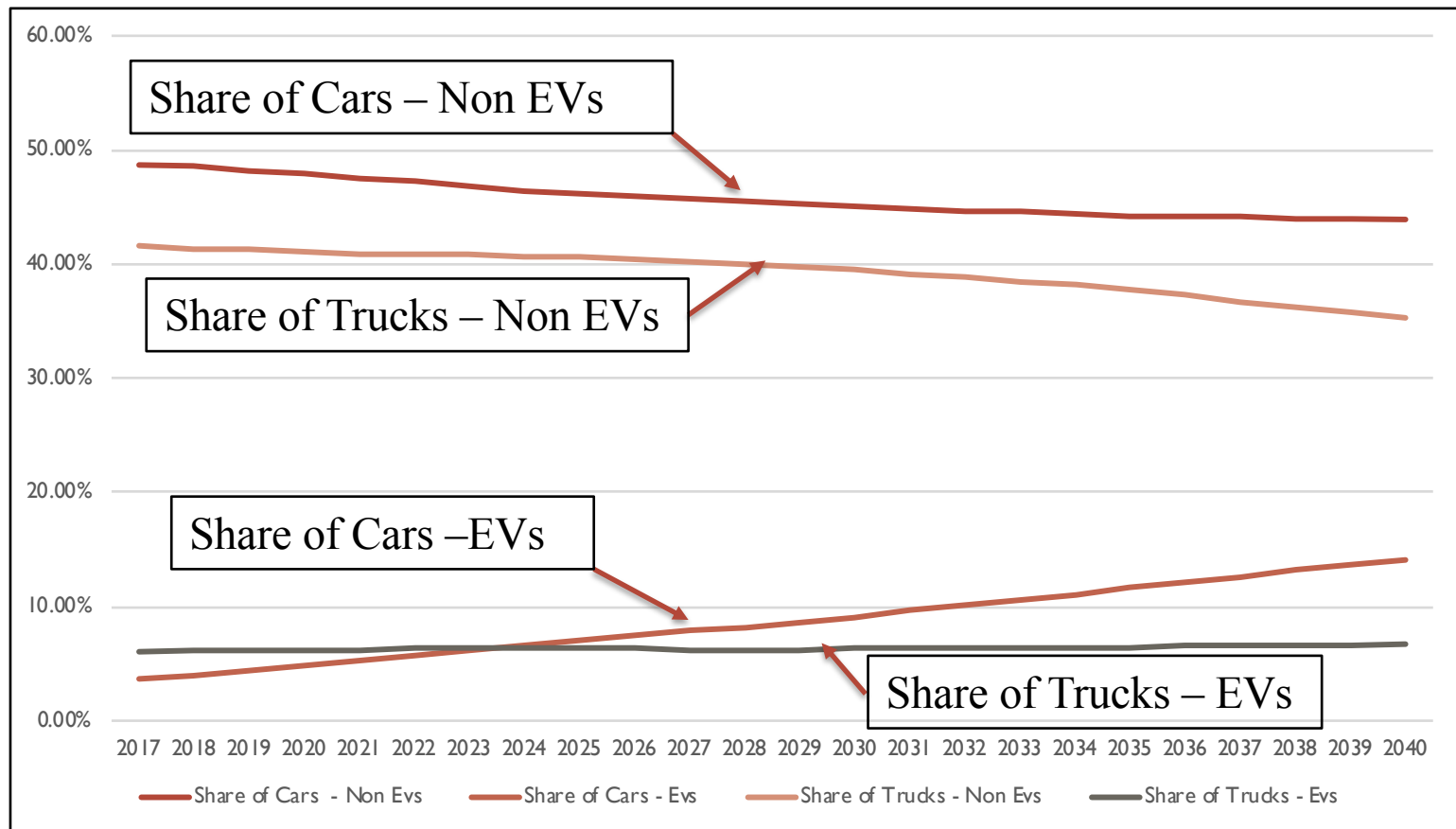
CA EV Sales Forecasts



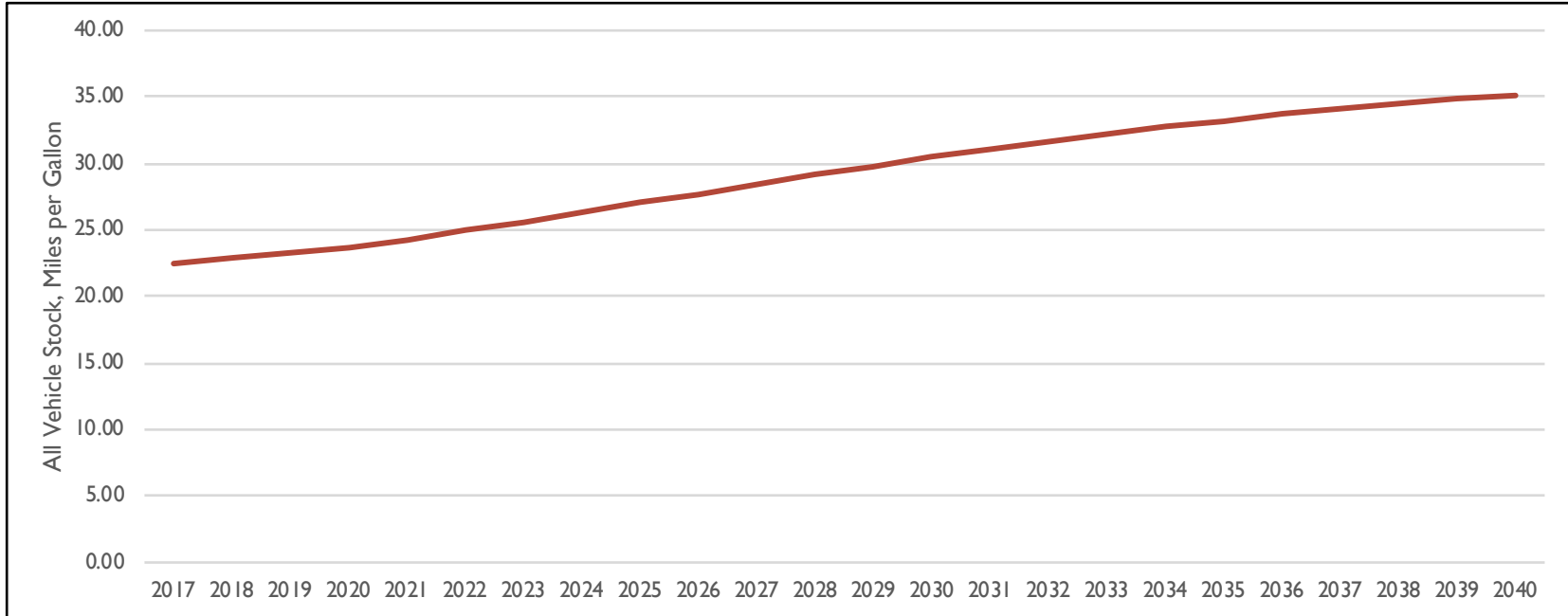
JP Morgan Forecast



EIA - Forecast of Vehicle Shares



EIA - Forecast of MPG, All Vehicle Stock





Thank You

This work is preliminary. Please do not cite without the author's permission.

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