

Electric Vehicles: Where are we and what's next?

Dan Bowerson

EV-Utility Industry Nexus: Charging Forward

June 28, 2019

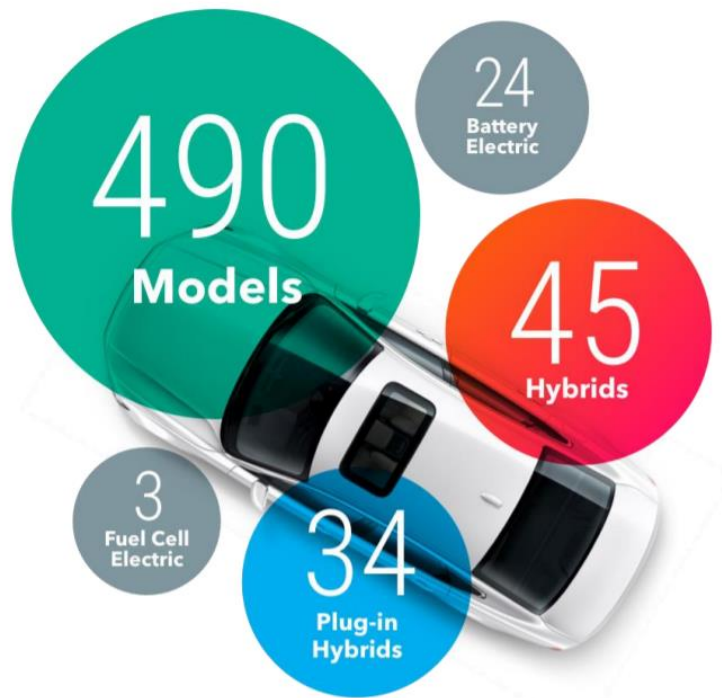


What is a “ZEV” (Zero Emission Vehicle)?

Three electric vehicle types:

1. **PHEV**: Plug-in Hybrid Electric Vehicle = Gas + Electric (Chevy Volt)
2. **BEV**: Battery Electric Vehicle = Electric Only (Nissan LEAF)
3. **FCEV**: Fuel Cell Electric Vehicle = Electric Only (hydrogen-powered) (Toyota Mirai)

Automakers Provide More Choice for Today's Consumers



In dealer showrooms, customers are finding greater MPG across all classes of vehicles, from cars to SUVs, vans and pickups

In 2019, 490 models are on sale that achieve high mileage*, including 45 models of hybrids, 34 plug-in hybrids, 24 fully battery electric models and the first fuel cell models. And more models are coming to market soon.

Find out what people drive in your state
www.AutoAlliance.org

* High mileage models achieve 30 MPG or more (highway) as listed on www.FuelEconomy.gov as of May 15, 2019.

Electric Vehicles (2018)

✧ Nearly All Segments ✧

BEV (14)	
BMW I3 BEV	Kia Soul EV
Chevrolet Bolt	Nissan LEAF
Fiat 500e	Smart Electric Drive
Ford Focus Electric	Tesla Model 3
Honda Clarity EV	Tesla Model S
Hyundai Ioniq EV	Tesla Model X
Jaguar I-PACE	Volkswagen e-Golf

PHEV (27)	
Audi A3 e-tron	Kia Niro Plug-In Hybrid
BMW 330e	Kia Optima Plug-In Hybrid
BMW 530e	Mercedes C350e
BMW 740e	Mercedes GLE-550e
BMW i8	Mercedes GLC-350e
BMW X5 xDrive40e	Mini Countryman S E ALL4
Cadillac CT6 Plug-In	Mitsubishi Outlander
Chevy Volt	Porsche Cayenne S-E
Chrysler Pacifica Hybrid	Porsche Panamera
Ford Fusion Energi	Toyota Prius Prime
Honda Clarity Plug-In Hybrid	Volvo S90 T8
Hyundai Ioniq Plug-In Hybrid	Volvo XC90 T8
Hyundai Sonata Plug-In Hybrid	Volvo XC60 T8
Karma Revero	

EVs are here...MANY MANY MORE ARE COMING!

- BEVs, PHEVs, & FCEVs
- More models: small car, large car, SUV, Crossover, Minivan
- Faster charging
- More options:
 - 2WD/AWD
 - Longer range
 - Luxury/economy
- Better performance
- Everything in between
- Auto investment likely to reach \$100 billion by 2025

But....

The Problem is NOT a lack of vehicles...
The Problem is NOT a lack of mandates, regulations,
or bans...

THE PROBLEM IS A LACK OF CUSTOMERS!

Consumers Wanted

Many factors drive consumer buying decisions, including vehicle costs, the price of gas and business and family needs

Market Share by Powertrain



Source: Ward's Automotive, 2019

Customers Must Be Onboard

“There are no paths to meet the PEV commitments and promises being made by automakers and politicians unless consumers are engaged in the transition to electric drive. Evidence from California says consumers are not.” [emphasis added]

○
Kurani, Ken and Hardman, Scott, *UC Davis ITS GreenLight Blog*, “Automakers and Policymakers May Be on a Path to Electric Vehicles; Consumers Aren’t.” 18-Jan-2018 retrieved from <https://its.ucdavis.edu/blog-post/automakers-policymakers-on-path-to-electric-vehicles-consumers-are-not/>.

Customers and the Market

1. Incentives
2. Infrastructure
3. Low Price Fuel
4. Consumer Education and Awareness

Do Financial Incentives Matter?



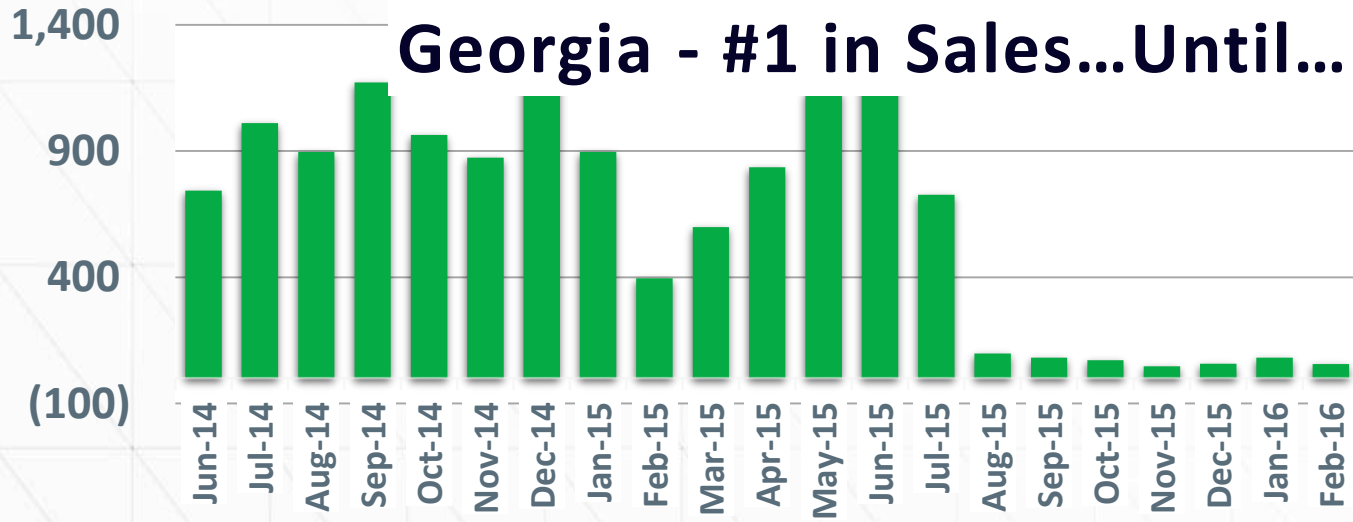
Services News Government Local

GOVERNOR ANDREW M. CUOMO PRESSROOM SCHEDULE ISSUES LEGISLATION ABOUT CONTACT

SEPTEMBER 27, 2017 | Albany, NY

Governor Cuomo Announces 74 Percent Increase in Electric Car Sales Since Launch of Drive Clean Rebate in March

ENERGY



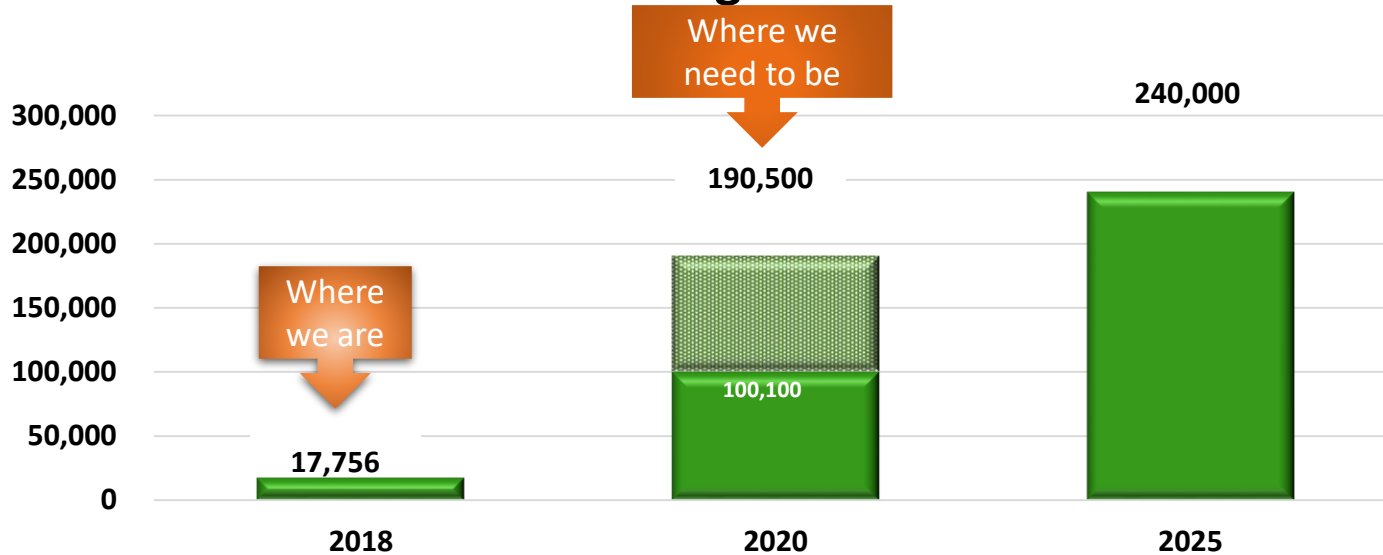
State Investment Critical – Example: CALIFORNIA

Current ZEV Commitments ~\$2.6 Billion	Additional ZEV Commitments from state (thru 2025) ~ \$2.5 Billion*
<ul style="list-style-type: none">• \$290 Million, infrastructure• \$550 Million, ZEV incentives• \$968 Million, CPUC• (Committed) \$800 Million, VW Settlement• Plus consumer awareness campaign, ZEV Action Plan, ride and drives, and more	<ul style="list-style-type: none">• 250,000 EV chargers• 10,000 EV DCFC• 200 hydrogen fueling stations• Affordable and available EV charging and hydrogen• Streamline infrastructure installation• Update ZEV Action Plan

*California Governor Brown Executive Order B-48-18

California Still Behind – EV Charging Infrastructure

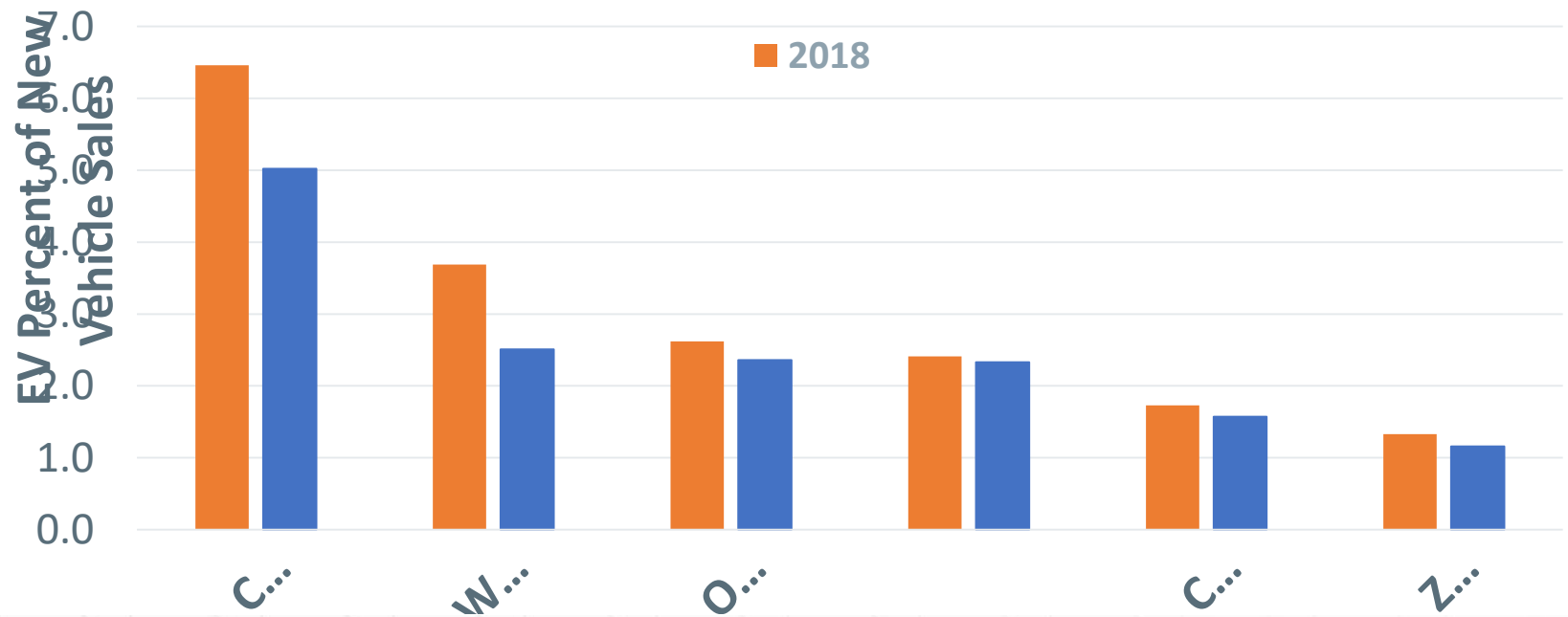
Public and Work L2 Chargers - Governor's EOs vs



Sources:

1. 2018 Chargers based on DOE AFV, retrieved November 30, 2018, from <https://www.afdc.energy.gov/locator/stations/>
2. 2020 based on EO B-16-12, and NREL, California Statewide Plug-in Electric Vehicle Infrastructure Assessment, May 2014, <https://www.nrel.gov/docs/fy15osti/60729.pdf>
3. 2025 based on EO B-48-18, January 26, 2018

Mandates ≠ Markets



* State with ZEV mandate

Alliance of Automobile Manufacturers (2018). Advanced Technology Vehicle Sales Dashboard. Data compiled by the Alliance of Automobile Manufacturers using information provided by IHS Markit. Data last updated 2/16/2018. Retrieved 2-Oct-2018 from <https://autoalliance.org/energy-environment/advanced-technology-vehicle-sales-dashboard/>

2019 MITSUBISHI
ENGLAND MOTORS
VEHICLE MANUFACTURING

Porsche's
BMW

FCA invests in factories to enable plug-in Jeep production, possible all-electric vehicles

JV is going all-electric

Ford plans to revamp Michigan plant for 2023 electric car production

Volkswagen is betting its future on electric cars

GM makes \$300 million investment to produce new Chevrolet EV based on Bolt EV

Toyota amps up U.S. EV plans to join new 'surge'

Volvo sees deals
Mazda to release first all-electric
Jaguar Land Rover on new platform, all-electric

Mercedes-Benz unveils aggressive electric vehicle production plan, 6 factories and a 'global battery network'



AUTO ALLIANCE

DRIVING INNOVATION[®]

BMW Group

FCA
FIAT CHRYSLER AUTOMOBILES



PORSCHE

TOYOTA

VOLKSWAGEN
GROUP OF AMERICA



AutoAlliance.org



[@/auto_alliance](https://twitter.com/auto_alliance)



[/autoalliance](https://facebook.com/autoalliance)