

Florida Public Service Commission: *EV Charging Roundtable*

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Commercialization Policy



Plug-in Electric Vehicles (PEVs):

Includes PHEVs, EREVs and BEVs

PHEV

**Plug-in Hybrid
Electric Vehicle**



**Chrysler
Pacifica Hybrid**



Prius Prime



**Ford C-MAX
Energi**



**Ford Fusion
Energi**

10-30 EV miles

EREV

**Electric Vehicle with
"Extended-Range"**



Chevrolet Volt



Cadillac CT6

40-60 EV miles

BEV

**Battery Electric
Vehicle**



Chevy Bolt EV



Tesla S

80-250 EV miles

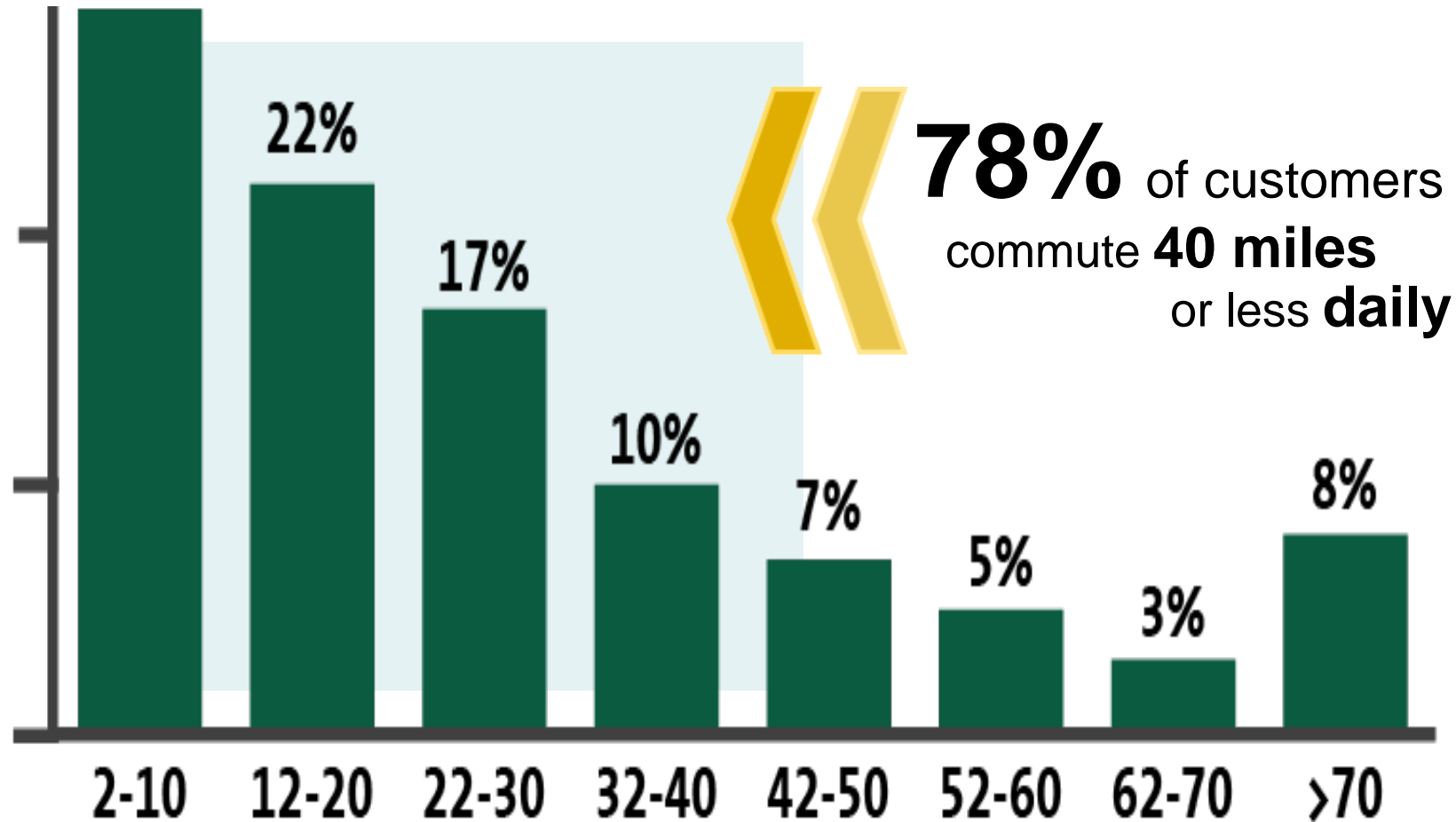


Nissan Leaf



BMW i3

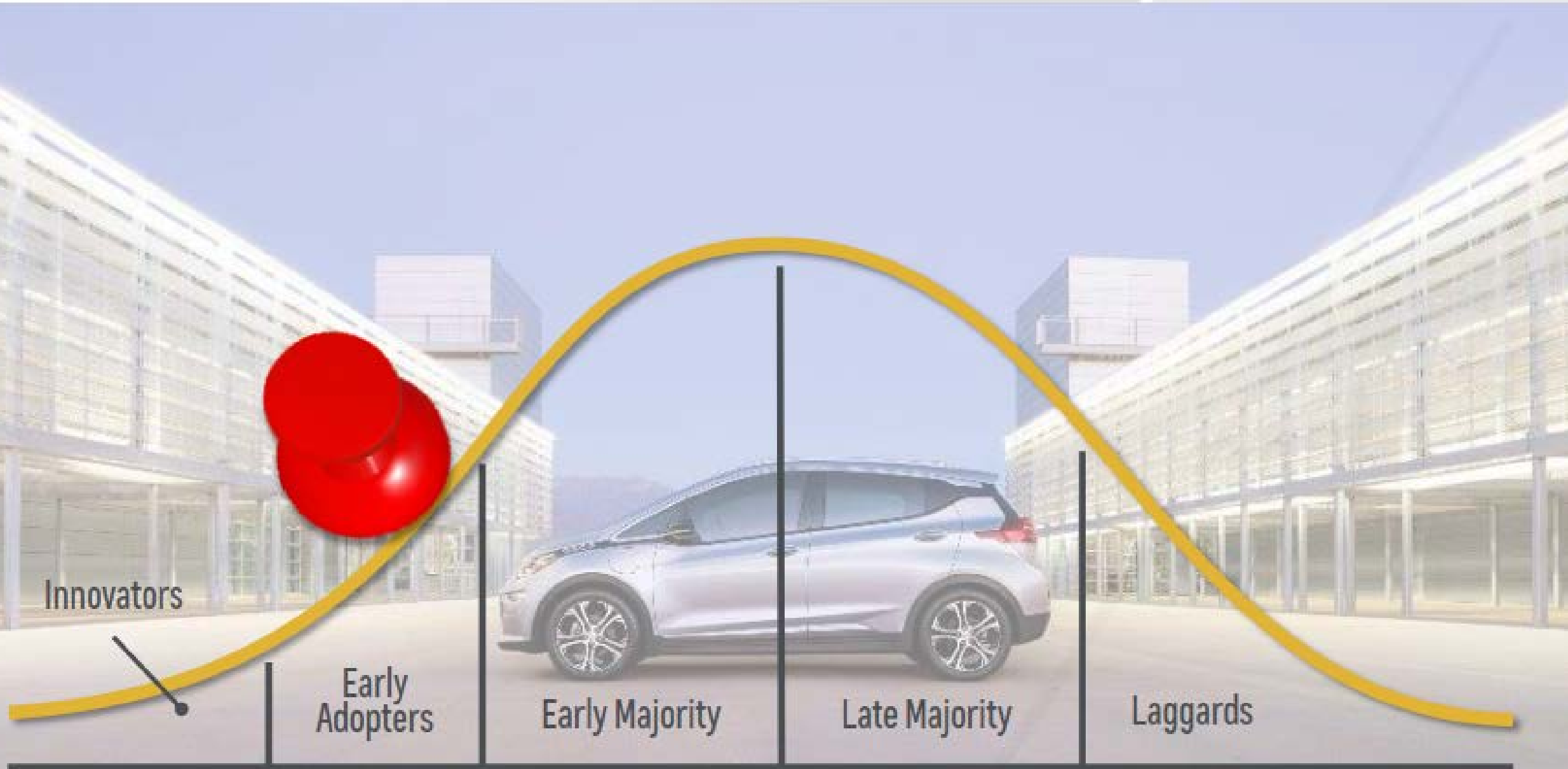
The Importance of 40 miles of Daily Electric Driving



Based on U.S. Department of Transportation 2003 Omnibus Household Survey

Why Target 40 Miles? → 40 Miles Is the Key to Daily Driving

EV ADOPTION IS HERE TO STAY



1st to 2nd Generation EREV Improvements: Chevrolet Volt

1 st Gen Volt	Metric	2 nd Gen Volt
38	EV Range (miles)	53
382	Total Range (EV+gas miles)	420
37	Fuel Economy (gas mpg)	41
16.5	Battery (kWh)	18.4
4	Passenger Capacity	5
3.4 sec*	0 to 30	2.6 sec
9 sec	0 to 60	8.4 sec
273	Torque (ft-lb)	294
3.3	Charger (kW)	3.6
80%	EV-only Trips	90% (exp)
900	Miles between gas fill-ups	1000 (exp)



Gen 1 Volt



Gen 2 Volt

* Edmunds

1st to 2nd Generation BEV Improvements: Chevrolet Bolt EV

1 st Gen EV (Spark EV)	Metric	2 nd Gen EV (Bolt EV)
82 miles	EV Range	238 miles
19 kWh	Battery	60 kWh
4	Passenger Capacity	5
86.3 ft ³	Passenger Volume	94.4 ft ³
3 sec	0 to 30	< 3
7.2 sec	0 to 60	< 7
3.3 kW	Charger	7.2 kW
3 states	Availability	50 states



Chevrolet Spark EV



Chevrolet Bolt EV

2017 CHEVROLET BOLT EV



TIME
BEST INVENTION

autoblog
TECHNOLOGY
CAR OF THE YEAR

Detroit Free Press
CAR OF THE YEAR



CARS.COM
BEST NEW
ELECTRIC VEHICLE



ars
MOST EXCITING
NEW BATTERY EV
COOLEST NEW
HATCHBACK



ROAD/SHOW
CAR OF
THE YEAR
DRIVELINE TECHNOLOGY
OF THE YEAR



MotorWeek
Television's Original Automotive Magazine
BEST NEW CAR BEST ECO CAR



2017
MOTORTREND
CAR OF THE YEAR*



The Detroit News
READER'S CHOICE
COMPETITION: MOST
ECO-FRIENDLY



ACEEE
THE GREENEST VEHICLES
OF 2017



CAR OF THE YEAR



The Car Connection
BEST HATCHBACK
TO BUY 2017
BEST ELECTRIC
VEHICLE TO BUY 2017

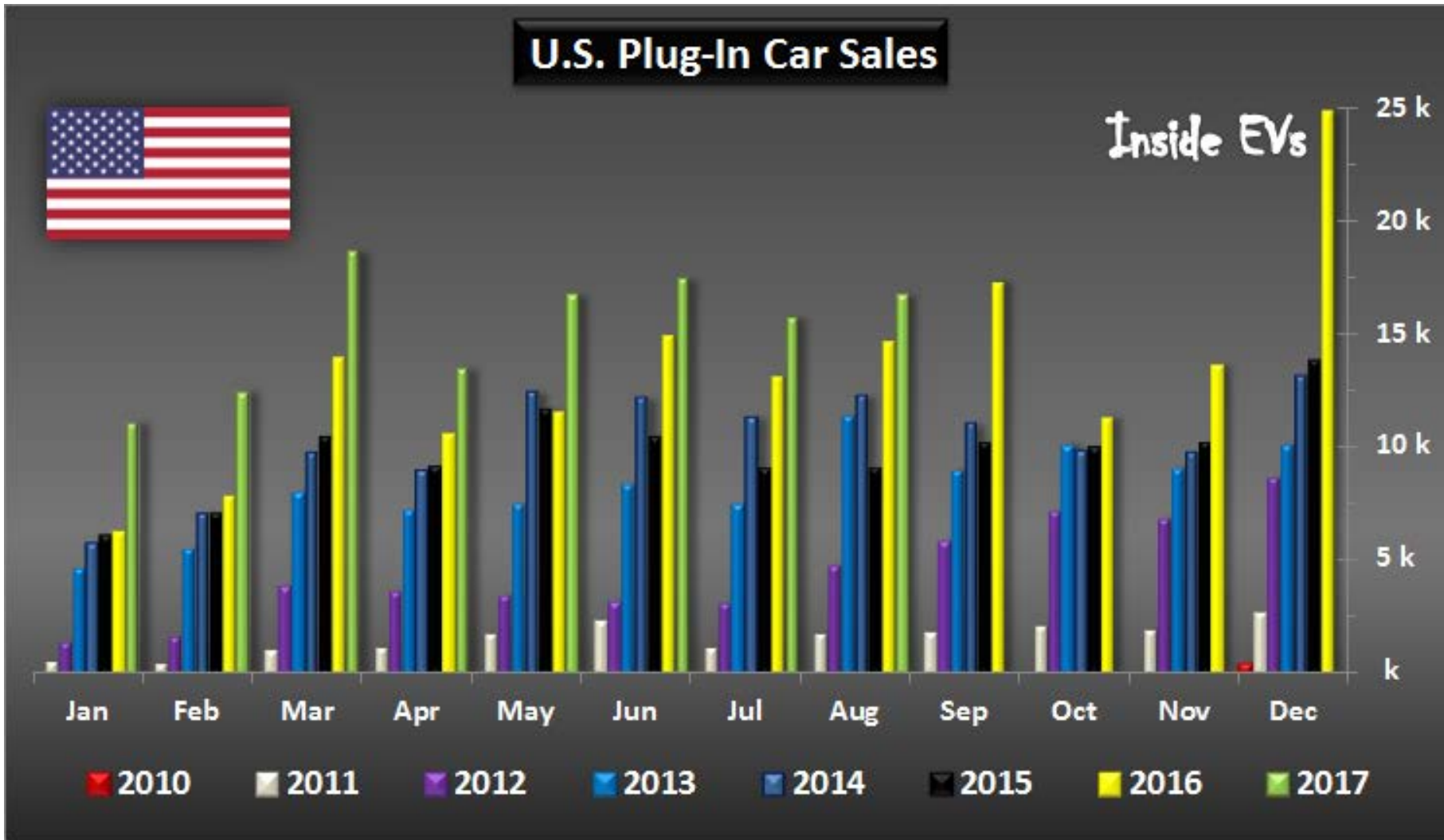


auto
connected car news
BEST MAINSTREAM
ELECTRIC VEHICLE OR
PLUG-IN HYBRID



CHEVROLET

Year over Year Sales Growth in the U.S. EV Market



- EV sales in the US have risen YOY for 23 consecutive months
- 31% EV sales growth in 2017 over 2016

A Robust EV Market Benefits Everyone ... at scale

- **Individual Benefits**

- Quiet and exciting ride & handling
- Fuel savings
- Ability to “fill up” at home

- **Societal Benefits**

- Economy (local spending, local jobs)
- Environment (local air, climate)

- **Utility / Grid Benefits**

- Load growth that’s “flexible”
- Renewable energy integration
- Downward pressure on rates



Scale Matters

EV Awareness – 2 Key Findings

July 2016 Market survey of
2,562 respondents
(nationwide)

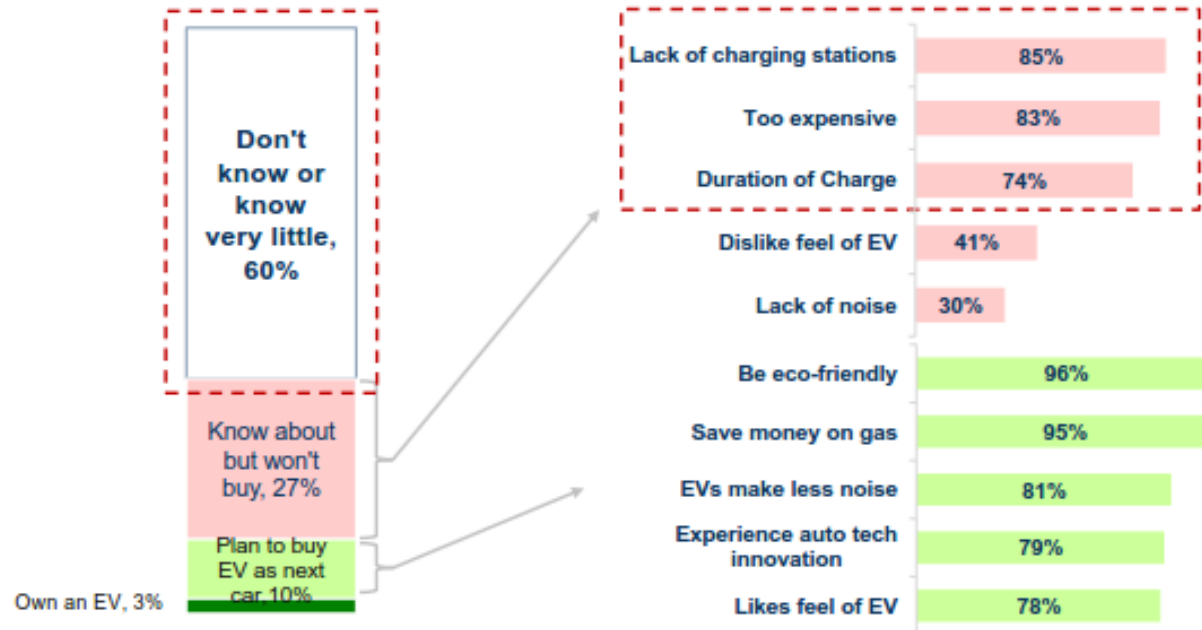
Electric Vehicle Finding 1: Perceptions

3

A lack of awareness, price and “range anxiety” represent the current main barriers to mainstream EV adoption (assuming vehicles were available)

Which of the following best describes your knowledge of electric vehicles?
(% of all respondents)

How important are each of the following factors in influencing your decision to purchase/not to purchase an electric vehicle?
(% of “won’t buy”/“will buy” who responded “Important” or “Very Important”)



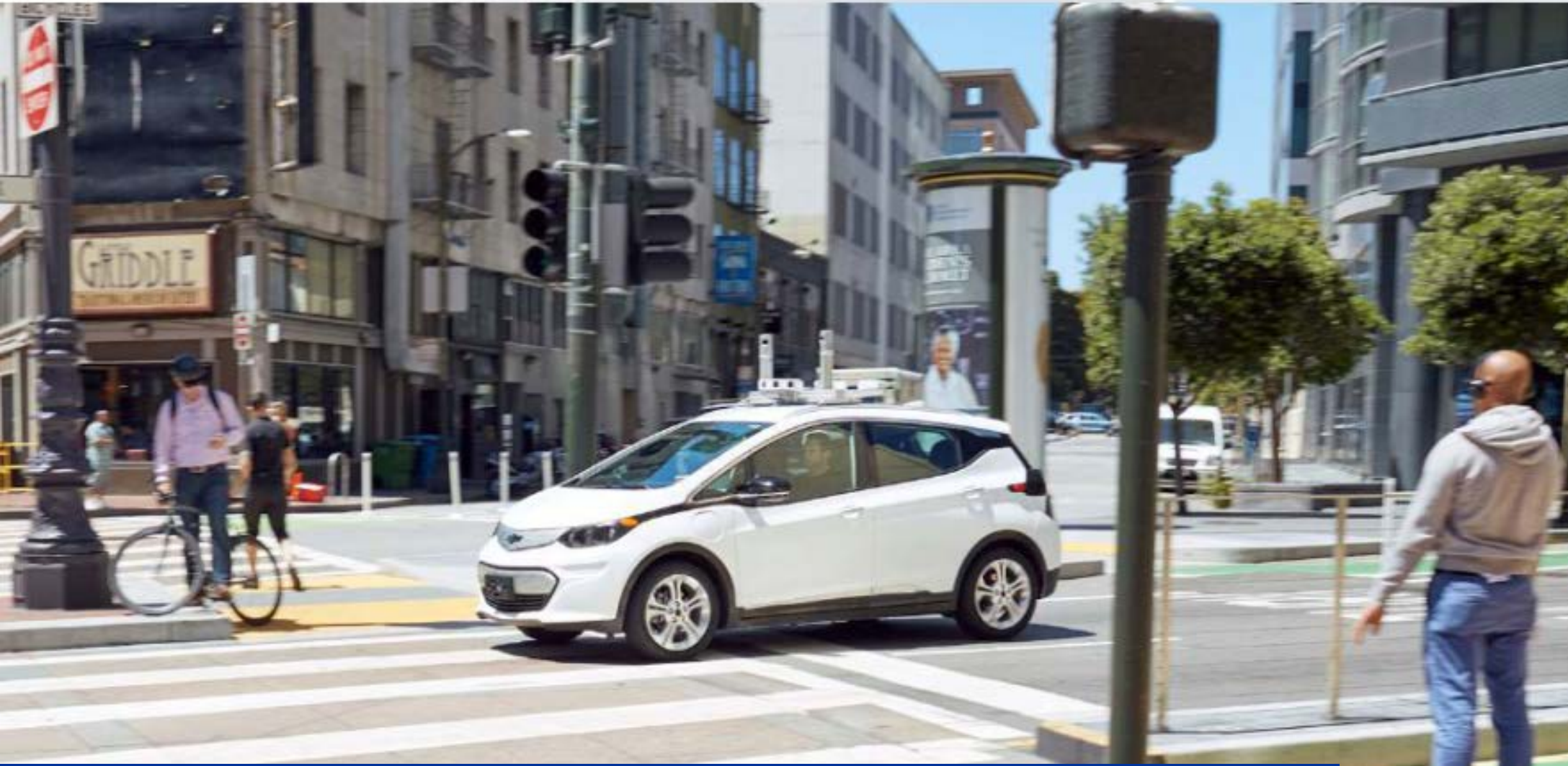
2 Key Findings:

- 60% know little/nothing about EVs
- Of the 27% that know something about EVs, 85% would not consider an EV because there is not enough EV infrastructure

(Next reasons were expense and time-to-charge)

Source: AV&Co. Connected Cars Survey, 2016, N = 2557; Question "evknowledge," "evpurchase," "noevpurchase"

EVS AND AUTONOMOUS



- \$14mil investment in Cruise Automation
- Expanding 50-vehicle Bolt EV fleet of self-driving vehicles to 180
- Operating in San Francisco, Scottsdale, AZ, and in the Detroit area

MAVEN CITY

Round-Trip Car Sharing

NUMBER OF CITIES

14 and counting

AVERAGE TRIPS

~14 Hours

~80 Miles

FAVORITE CARS

Chevrolet Volt
Chevrolet Tahoe

MAVEN HOME

Exclusive closed-community car-sharing

AVAILABLE IN

Residences in DC, San Francisco + growing.
(Multiple non-exclusive properties as well)

AVAILABLE TO

> 8,000 Residents and counting

MAVEN GIG

Solutions for the Gig Economy – Ridesharing, Delivery Services.

Short-term rental includes vehicle, maintenance, insurance.

AVAILABLE IN

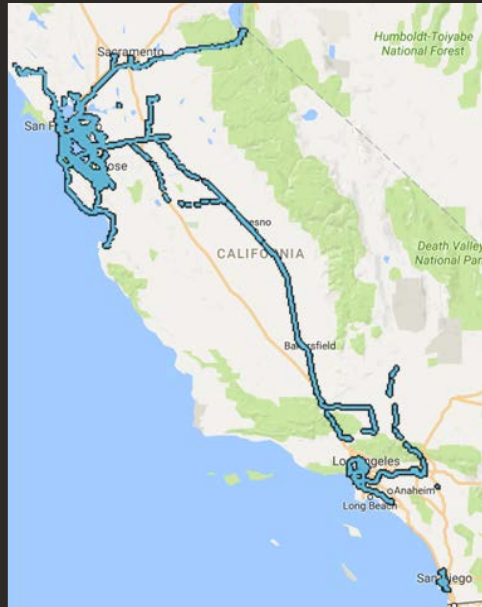
11 Cities

MILES DRIVEN

143 Million



- Program designed, in part, to help new drivers and new riders get exposure to EVs
- Ride-sharing drivers typically do not have charging at home, so they must leverage public charging
- Building confidence through the infrastructure network (among other things) is critical for long-term success



GIG / BOLT EV MILEAGE

>1.4 million miles driven

10% > 238 MILES IN A DAY (Battery Capacity)
 INSTANCES >400 MILES IN A DAY **64**

GIG / BOLT EV CHARGING

Total DCFC Events	>14,000
Total kWh	>400,000

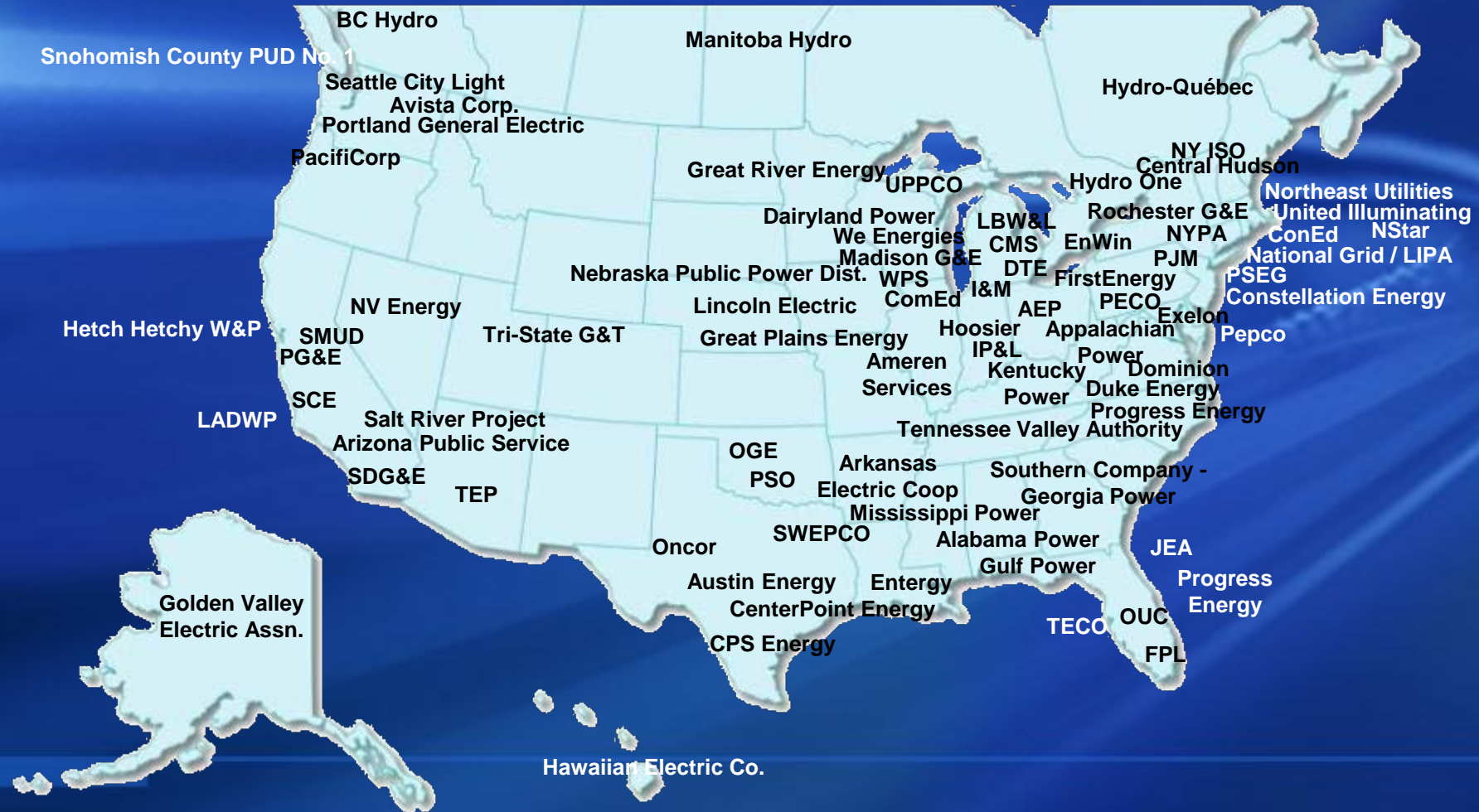
GIG / BOLT EV RIDERS

>140,000

Since Early Feb 2017

GM / EPRI / Utility Collaboration:

- Largest existing auto-utility collaborative effort -- formed in 2007
- Over 50 utility members and the Electric Power Research Institute (EPRI)
- Focus areas: Aligned Messaging and Policy Priorities, Customer Outreach and Infrastructure, Vehicle-to-Grid Technology, New Business Opportunities



Florida EV and Infrastructure – Opportunity

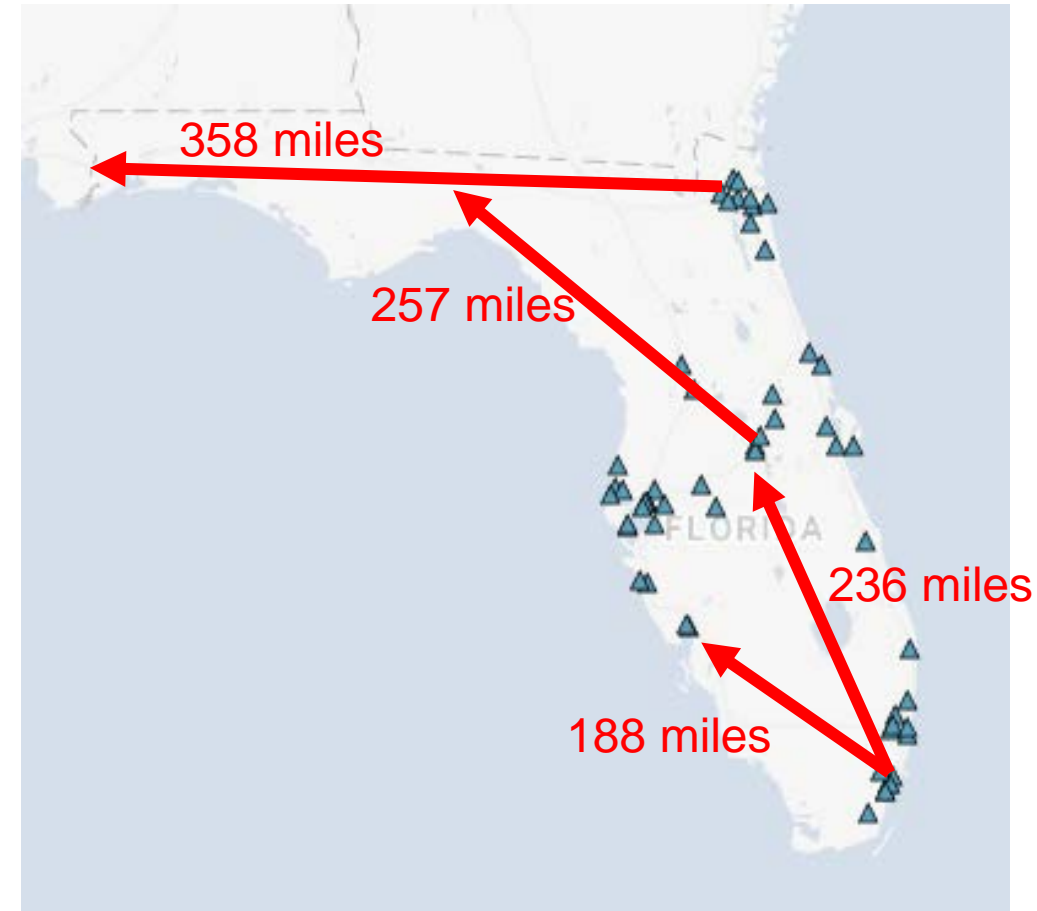
- **Total FL EV Sales to Date: 23,202 (through June)**
 - #5 state in EV Sales
- **877 publicly available charge sites (L1, L2, DC)**
 - 56 SAE DCFC



DCFC Network in FL – Major Gaps
(public, nonproprietary chargers)







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EV Infrastructure – Where, What, Why Guidance

	Home		Work	Public			Commercial	Commuting	Road Trips
	Single Family Home	Multi-Unit Dwelling	Workplace Charging	Short-dwell public	Mid-dwell public	Long-dwell public	Urban high-mileage applications	Urban-to-Urban Corridors	Long-distance Highway Corridors
Parking/Charging description ... e.g.	Overnight	Overnight ... condos, apartments	Work shift	1-2 hours ... retail	4-8 hours ... parks, beaches	1-X days ... airports	High-use stations ... “shared”, autonomous	(<200 miles)	(>200 miles)
Near-term	L1 or L2 (L2 recom'd)	Neighborhood L2 and DC (50kW) 	L1 or L2	L2	L2 	L1 or L2 	High-speed DC 50-150kW (mega-stations) 	High-speed DC 50-150kW 	High-speed DC 150kW 
Long-term	L1 or L2 (L2 recom'd)	L1 or L2 at Multi-Unit Dwelling	L1 or L2	L2	L2	L1 or L2	150-320kW	150-320kW	150-320kW
Importance to Consumers	Where most charging is done	Need to grow EV market to these consumers	Where many consumers see EVs for the 1 st time (EV Showcase) and most user charging after “home”	Nice perk (and retailers benefit from increased in-store dwell time)	Increases practicality of EVs (the number of places an EV can go)	Increases practicality of EVs (especially among early adopters/professionals)	Enables commercial EV business cases (e.g. Lyft/Uber car-hailing services)	Increases practicality of EVs (especially among early adopters/professionals)	Increases consumer confidence in EVs (perception of endless EV range)

• Note, Professional installation of L1, L2 and DC is always recommended

• **Note, Future 150-350kW SAE fast-chargers will be backward compatible, allowing 50kW EVs to charge** 

 Station redundancy is especially important

Where should Utilities engage?

1. Engage actively in home, workplace and DC fast-charging

- Most charging at home, so this is a way to reach all consumers (including those in multi-dwelling units)
- Workplace charging is key to growing EV awareness and corporate relationships are key to utilities
- A visible strategy of DC fast-chargers tells a big story to consumers and grows EV adoption among fence-sitters

2. Ensure electricity is cheaper than gasoline (residential and commercial) – incl. demand charges

3. Engage actively in PEV outreach and education

- Utilities are trusted 3rd parties and operate at a local level – key for building awareness

Utilities need to be active participants in growing the PEV market

- This is a “learning” transition requiring hands-on experience to shape next steps
- The PEV market will not escape “niche” unless utilities (and regulators) get involved



Bolt EVs at GM's Lake Orion Assembly Plant (MI)

Backup Slides

CHARGING DETAILS



Level 1 – 120 volt

Up to

4

miles per hour of charge

- / 120v charge cord comes standard
- / Opportunity/top up charging

Level 2 – 240 volt

Up to

25

miles per hour of charge

- / AeroVironment 240 volt/32 amp
- / Available via GM Accessories
- / Public & workplace charging

DC Fast Charge

Up to

90

miles in about 30 minutes of charge

- / Public stations only
- / Great for road trips; stop for lunch/coffee to recharge

What will it take to Grow the PEV Market?

- **Drive Consumer Demand!**
 - Keep a Laser-like Focus on the Vehicle (don't get distracted by other "metrics")
 - Build **Awareness** through:
 - Promotional Campaigns (that really get to new car buyers)
 - Ride & Drives ("Butts-in-Seats")
- **Install Charging Infrastructure at a faster pace (incl. role for utilities)**
 - Address the "Perception" that there isn't enough infrastructure
 - Public DC Corridors (SAE Combo)
 - Workplace Charging
- **Affordability/Incentives**
 - Help make these vehicles more affordable for mainstream consumers:
 - Through incentives, help make this an easy choice, until OEMs can get more cost out of the technology
 - Stay steady until we reach a meaningful tipping point