DOCKETED

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POU’s and Transportation Electrification

CEC Workshop

10-5-2016

Growth of the ZEV Market

ZEV Market Growth Dependent on Many Factors

Phase 1

- Target Markets: Medium Fleets, Urban
- Majority Charging: Home, Work
- EV User Data Exchange critical to planning
  - Little information about EV and EVSE usage
- Early infrastructure upgrades to local infrastructure in EV high density neighborhoods, (higher income areas)
- MUD infrastructure and Older properties, unable to participate without Govt. upgrade incentives / assistance. (lower income areas)

Phase 3

- Target Markets: All Consumers
- Majority Charging; Home, Work, MUD lagging but improving
- Fully Developed Charging Business Models; fast charging broadly available
- Government Incentives Phased out
- Intelligent charging still limited to Large Urban Markets
- Distant Suburban markets still EV challenged
- Colder climates still slow to adopt

Infrastructure Development

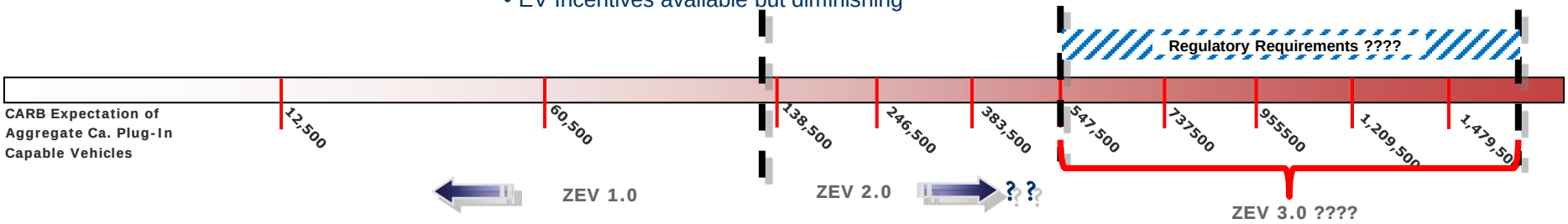
Full PEV Charging Business Case

2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025

Business Case Development/Proving

Phase 2

- Majority Charging: Home, Work Charging but MUD still challenged
- EV TOU rate tiers implemented
- Target Markets: Intra-City Car rental, Medium & Small Fleets, Urban, Suburban
- POS Public Charging Sales common - Begin Roaming Charging
- (Late Phase) Public Gen II Smart EVSE begin replacing Gen I with full grid communication
- EV Incentives available but diminishing



Consumers (PEV Readiness): Too Many Questions not Enough Answers

Stakeholders: OEMs, Utility Companies, EVSE Suppliers, and Local, State, Federal Government

Current Questions

Future Market Success

Consumer

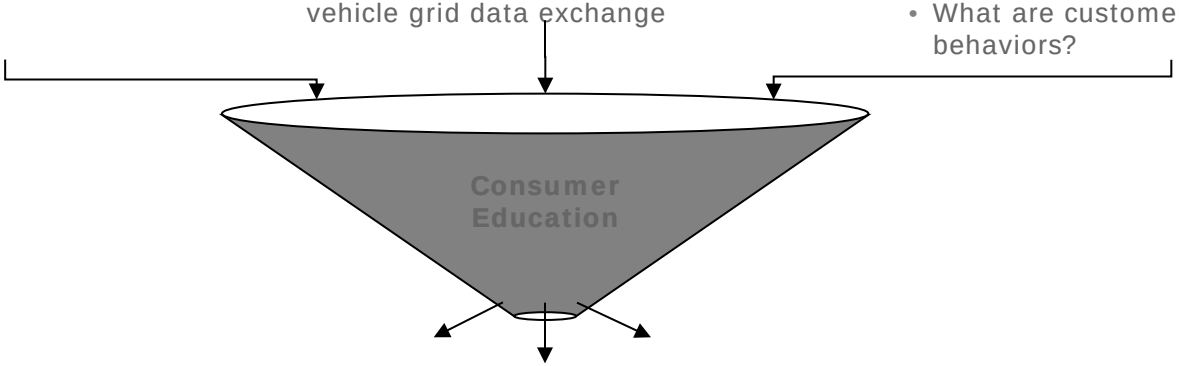
- Will Driving habits change?
- Range Anxiety
- Wireless Vehicle-to-Consumer Communication Tools, Value added or gimmick??
- Preferred EV customer charging times?

Technology Safety

- Customers are not educated regarding the safe use of electric vehicles
- Customers are unaware of the benefits of an intelligent electric vehicle
- Security of Customer Data and vehicle grid data exchange

Infrastructure

- Where are charging stations needed?
- What type of charging is preferred by customers? (AC, DC)
- Will customers take advantage of intelligent communication between the vehicle and grid?
- What are customer charging behaviors?

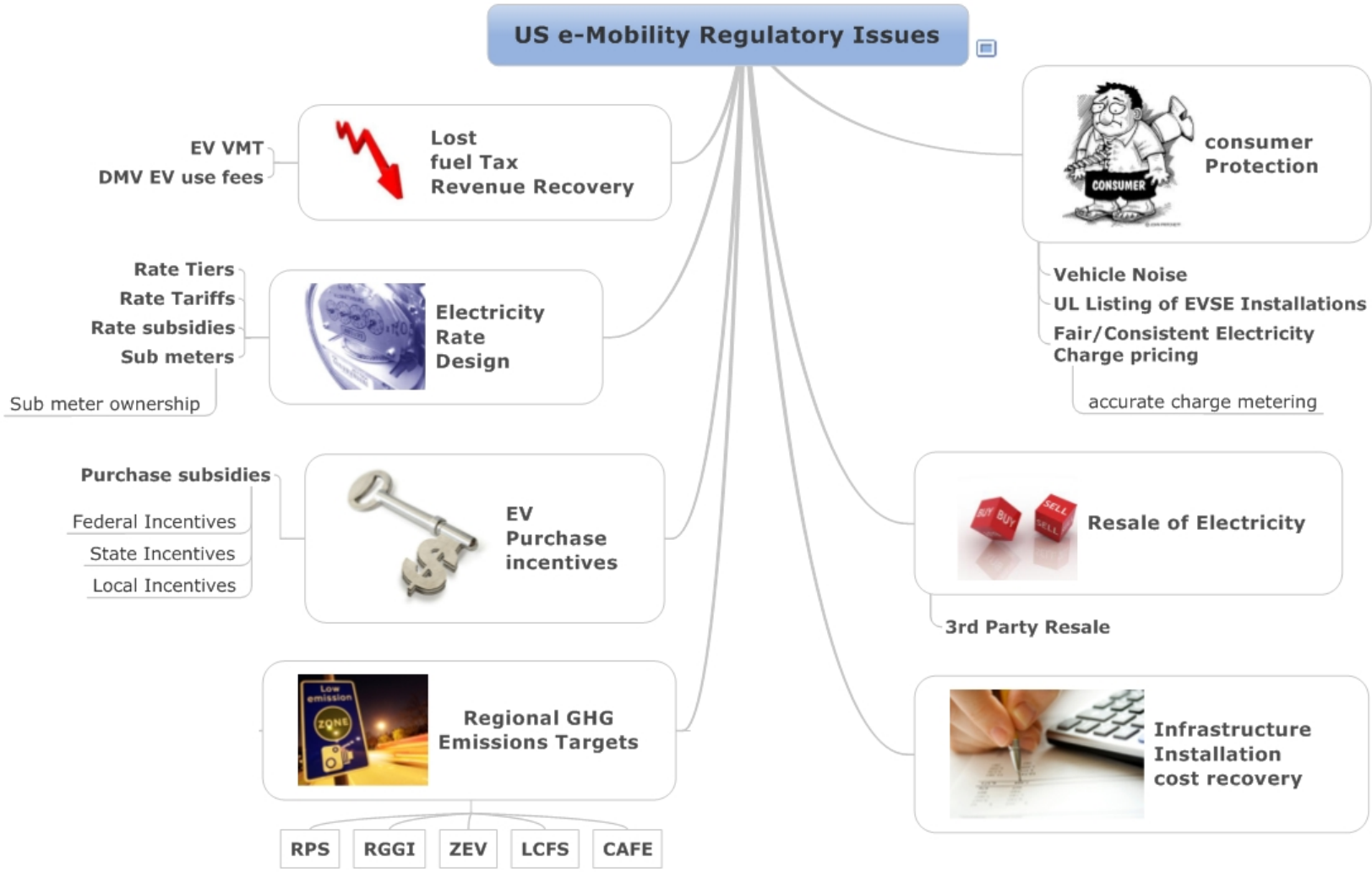


- Localized Customer Driving Habits matched with vehicle capabilities
- Ability of the utility to communicate TOU incentives to ratepayer base

- The preferred method of customer charging and at what times is understood – AC level 1, AC level 2, or DC fast charge
- Preferred Charge times education of customers in preparation for mass market penetration of EVs

- Customer able to fully realize Roaming Charging
- Customer feels secure with safety of Roaming Charging Profile information
- Customer remote services (internet, I-phone apps) uses are defined and utilized

EV Market Growth:
Vehicle / Utilities Regulatory Issues



Public Charging Infrastructure
(The case for broad Urban DC Fast Charge)

Large numbers of Consumers will depend on Public Charging Locations

Not enough Private garages, Not enough Apartment Charging, Not enough workplace Charging

Where will people charge, Work? ….. Home?

- There are only 60 Million private garages in the US for the ~140 Million LDV on the road. (2010 US Census)
- **63%** of US residents live in Multi-unit housing where installation of charging units is not in their control and not feasible for landlord
- **98%** of US workforce employed at locations with less than 20 workers, or large rented complexes with no on site charging capabilities.
- Recent studies indicate that **86%** of potential Plug-in vehicle owners will want to charge both at work and at home.

The result

- **>60% of potential market live in locations with no home charging, MUD or rental**
- **98% or workforce has no access to at work charging**

What is likelihood of selling PEVs to this demographic?

California's Projected L2 EV Infrastructure "Gap"

Attach Rate: Relationship between EVs & public EV ports—defined as # of "public" EV ports deployed per EV sold ("public" defined as non-single family residential)

- **50% Attach Rate**: Short-term "target" rate to support rapid pace of EVs sold in next 5-10 years

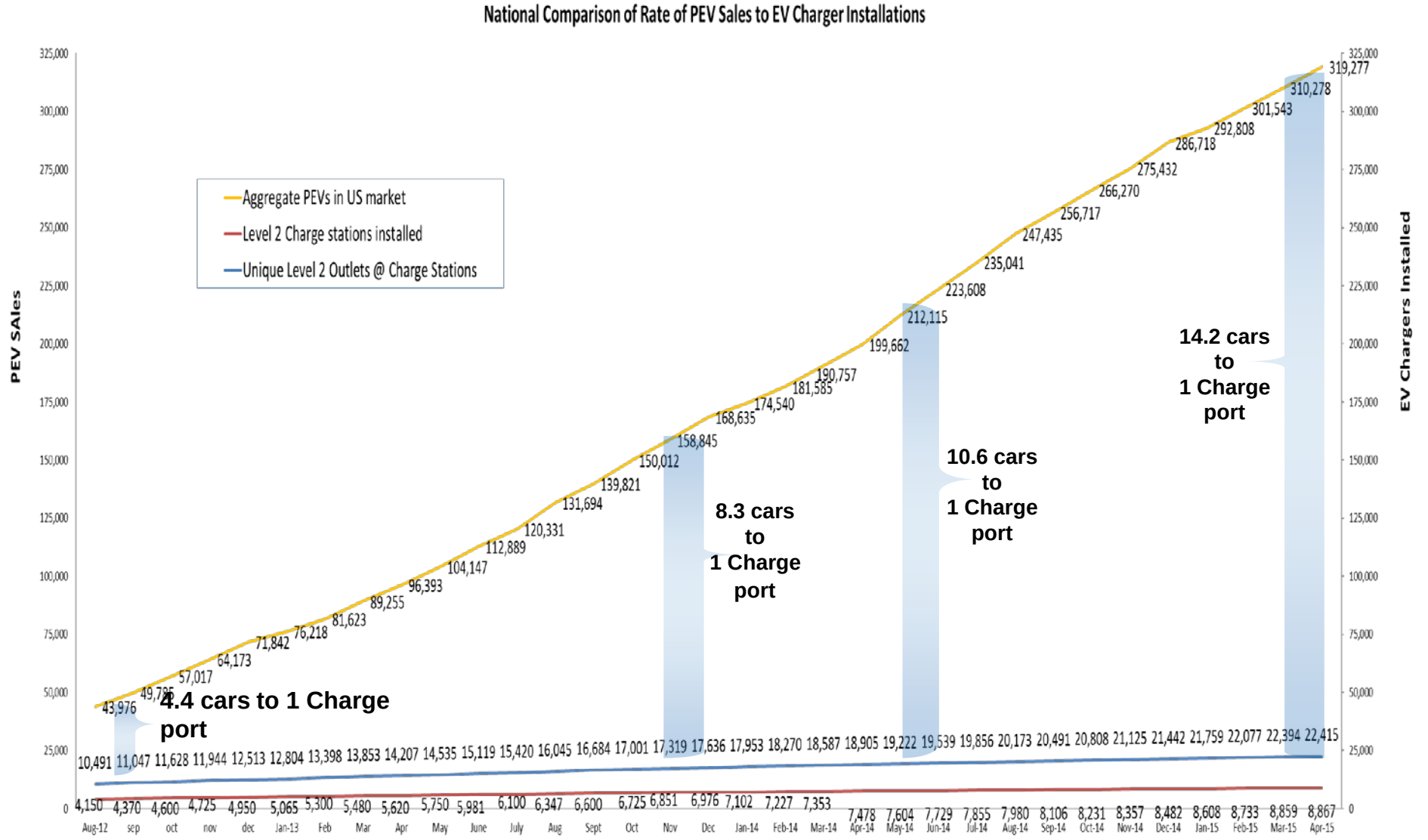
- **15% Attach Rate**: Historical relationship observed in largest EVSE provider charging port portfolio, which has already generated complaints from EV customers regarding lack of public EV infrastructure

- **5% Attach Rate**: Unsustainable public EV infrastructure platform and will retard new EV adoption

EV/PHEV New Car Sales Projected Growth (Cumulative Sales)					**Charge Ports**	
	2012 Registered EVs	2012 Public Charge Ports	2013 Registered EVs	June 2016 Cumulative PEV vehicles	Req'd 2016 Public EV Charge Ports (50% Attach Rate)	**ACTUAL** June 2016 Actual L2 Charge ports
CA	29,640	4,348	65,652	223,687	**111,843**	**10,206**
US Total	76,133	17,203	168,635	>500,000	**250,000**	**16,486**

Based on the above information
California alone will need approximately $542 Million
in "public L2" charging ports for 2016!
(at $5,333/ public charge port installation cost, recent charge-point estimate)

Nationwide US PEV Sales Compared to Level 2 EV Charger Installations



5R's of building blocks for a National Charging Network

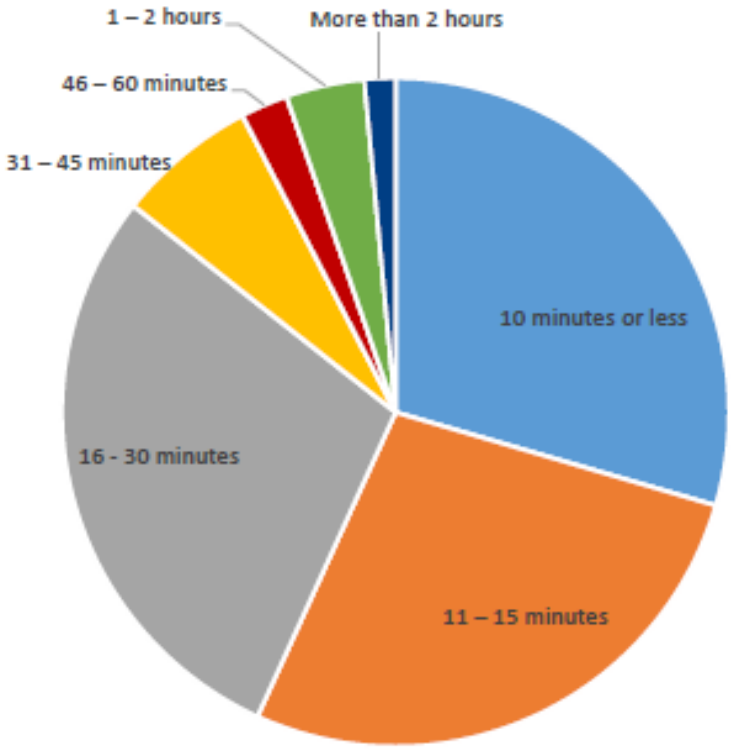
Future efforts to expand infrastructure need to be open, reliable, equitable and inclusive

RELIABLE	• Equipment Service Level Agreement (SLA) with no less than 48 hour inoperability • Domestic parts supply and field-based technicians for rapid maintenance response • Consistent customer experience across the country (aesthetics, price, payment options power output)
REDUNDANT	• Multiple chargers required per location to increase driver confidence • 'Fueling station' model provides access despite queuing or inoperability risks • Provides higher level of visibility of infrastructure for EV and non-EV drivers
RELEVANT	• Equipment needs to service all fast charge capable EVs • Connector 'standards' a non-issue with dual-capable charging stations the new 'standard' • Upgradability and backwards compatibility for future and existing EVs
RAPID	• Need to meet customer expectations of 30 mins or less to charge despite battery size • Closer wait time experience to traditional fueling increases EV accessibility • Large power requirements need proactive involvement of utilities - power availability and demand chargers will make or break ROI
REGIONAL	• Phased approach will allow for more traveled corridors to be prioritized • Rural areas needed to allow national travel, dispenser requirements may be minimized • Metro 'hubs' still required as UIO grows

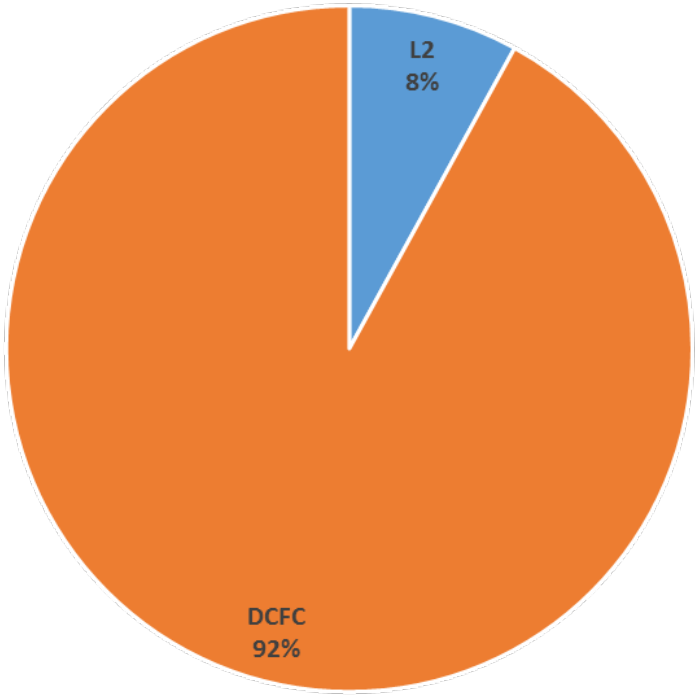
The Need for Greater Speed

Owners and intenders want charging times closer to traditional fueling. LEAF drivers greatly prefer Fast Charging in public.

BEV owner wait time expectations on DCFCs



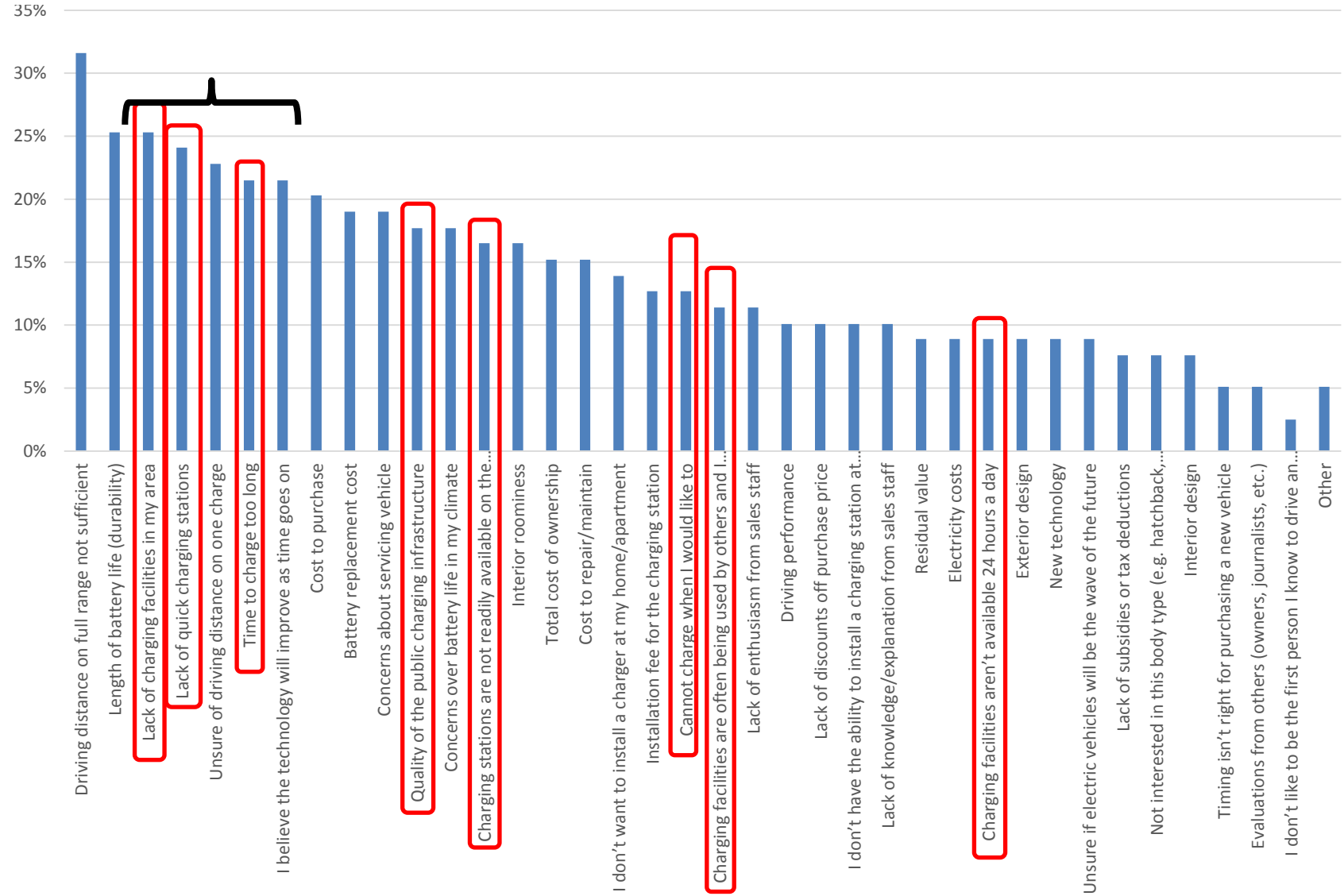
Recent monthly LEAF charging sessions at locations with collocated L2 & DCFC



VOC from EV rejecters

Rejecters

After battery range and durability, infrastructure is the next highest reason for rejection of BEVs.



A Model for OEM Partnerships with Utilities

Nissan has partnered with Key Utilities to develop a Model for a workplace L2 rebate program

- **Co-investment in Utility L2 Infrastructure programs**
  - NNA partnered with Georgia Power (GPC) to jointly support workplace and MUD charging for 12 month period.
  - NNA developed a utility rebate match for L2 equipment and installation through $250K co-investment in program.
  - Companies jointly marketed program with NNA Business Development Manager facilitating applications to the program.
- **Outcomes of NNA-utility partnership:**
  - 500 rebates have been claimed to date, to over 115 companies, apartment buildings, office complexes and universities
  - As part of the rebate program, each of the 115 entities have agreed to host Ride and Drives with employees and residents.

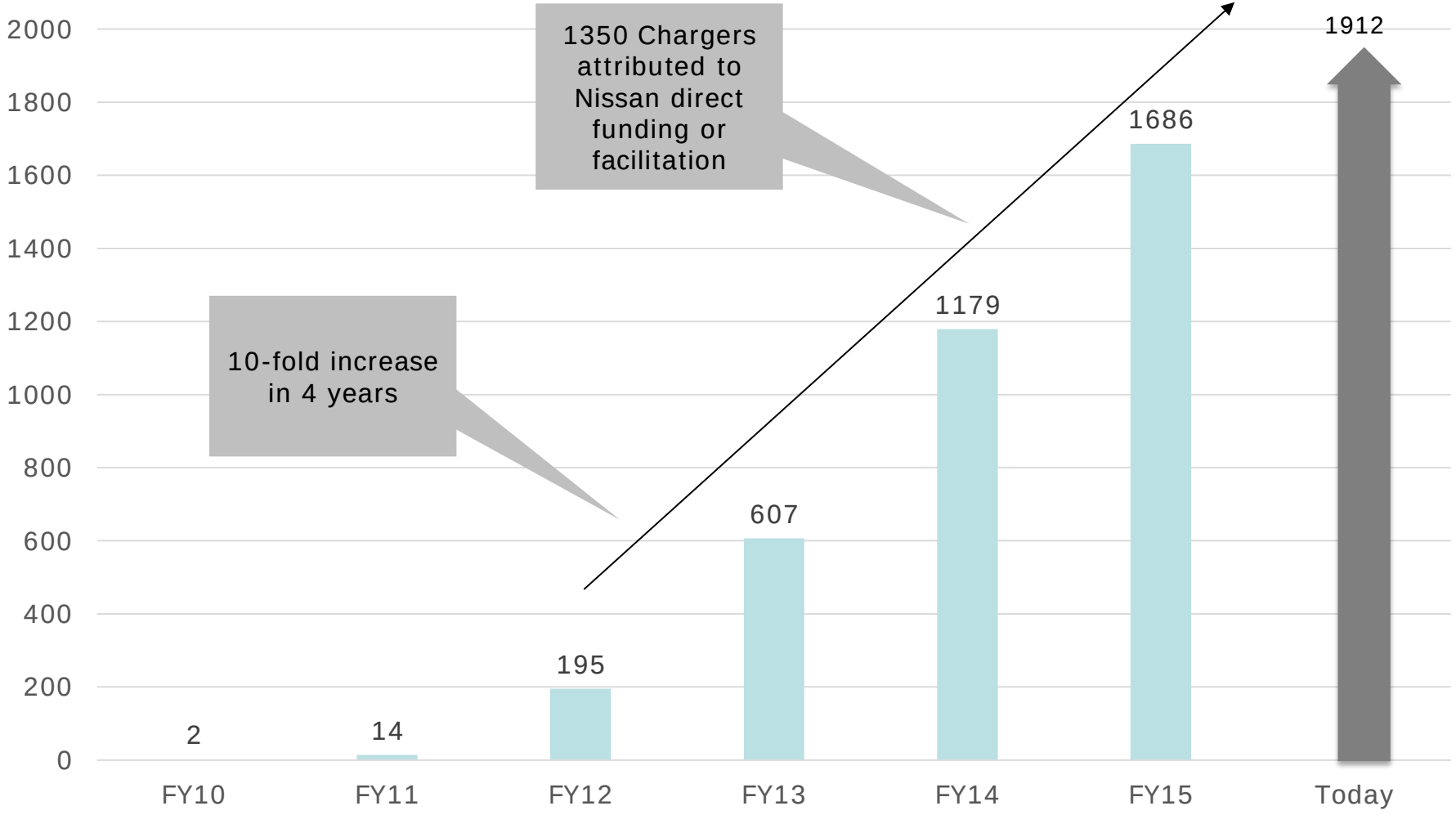
Conclusions

- Lack of public DCFC infrastructure in high density urban environments limits the viability of BEVs for those consumers.
- Meeting ZEV targets will be extremely challenging, low BEV sales to “Average” consumers unable to justify purchasing limited range vehicles with limited charging opportunities.
- Incentives/tax breaks needed for business’ to install PEV infrastructure are required to kick-start a large increase in workplace charging.
- PEV range, capabilities and vehicle platforms are increasing rapidly….. *Publicly funded EV infrastructure projects must be **able** to upgrade capacity and technologies for near and long term charging requirements*.
- 5 R’s of National Charging Infrastructure; Rapid, Reliable, Relevant, Redundant, Regional

Appendix

Nissan DC Fast Charge Efforts

Nissan continues to invest in expanding Fast Charger availability in US



Leadership in Metro Fast Charging

Promotional program for new LEAF customers providing 24 months free public charging at over 1,000 participating DCFCs

No Charge to Charge now in 50 cities representing almost 90% of LEAF sales

"No Charge to Charge" is available in:

Atlanta	Columbia	Knoxville	Orlando	Reno
Austin	Columbus	Las Vegas	Philadelphia	Sacramento
Baltimore	Dallas-Ft. Worth	Los Angeles	Phoenix	Salt Lake City
Boston	Denver	Minneapolis-St. Paul	Pittsburgh	San Diego
Chattanooga	Detroit	Monterey	Portland, OR	San Francisco
Chicago	Fresno	New York	Providence/ New Bedford	Santa Barbara
Cincinnati	Houston	Nashville	Raleigh-Durham	Seattle
Cleveland/Akron	Indianapolis			Washington D.C.

EZ CHARGE

Consumers can find chargers eligible for No Charge to Charge via the Nissan LEAF EZ-Charge℠ App for iOS or Android at EZ-Charge.com/stations.

MORE THAN **205,000** Global Sales
LEAF is the world's best-selling EV.

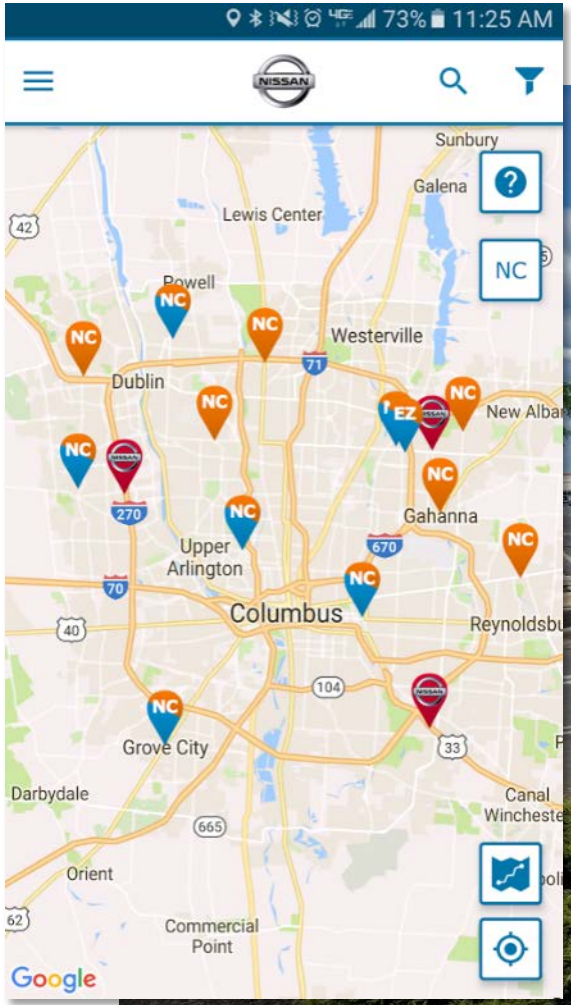
MORE THAN **90,000** U.S. Sales

30 MINUTES
Public quick chargers can charge a LEAF from 0 to 80% in less than 30 minutes

107
Miles of range on 2016 LEAF SV and SL models

Nissan's focus on metro-market coverage

Metro area coverage includes dual-capable Fast Chargers at retail & hospitality sites with many local and national brands



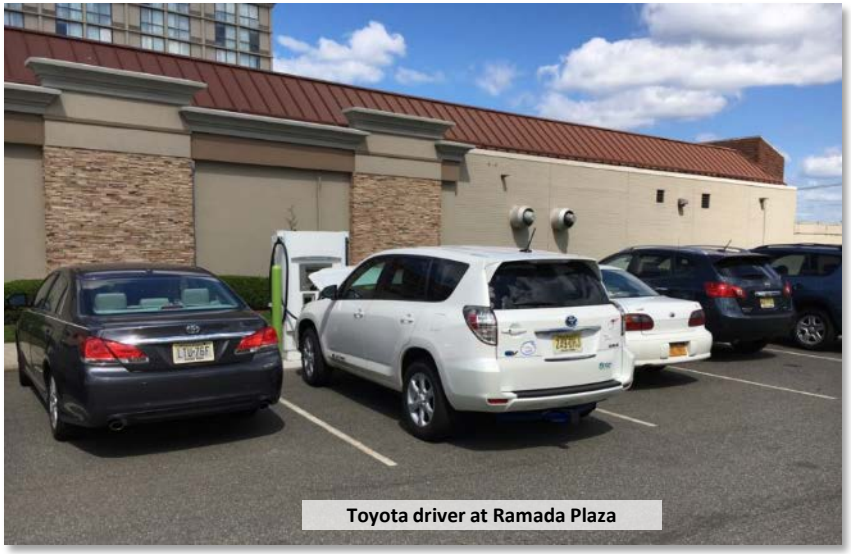
“Infrastructure for all”

Nissan’s infrastructure investment has benefited all fast-charge capable EVs through installing ‘Dual’ Fast Chargers. Most dual fast chargers in US funded by Nissan.


Nissan driver at Hilton Garden Inn

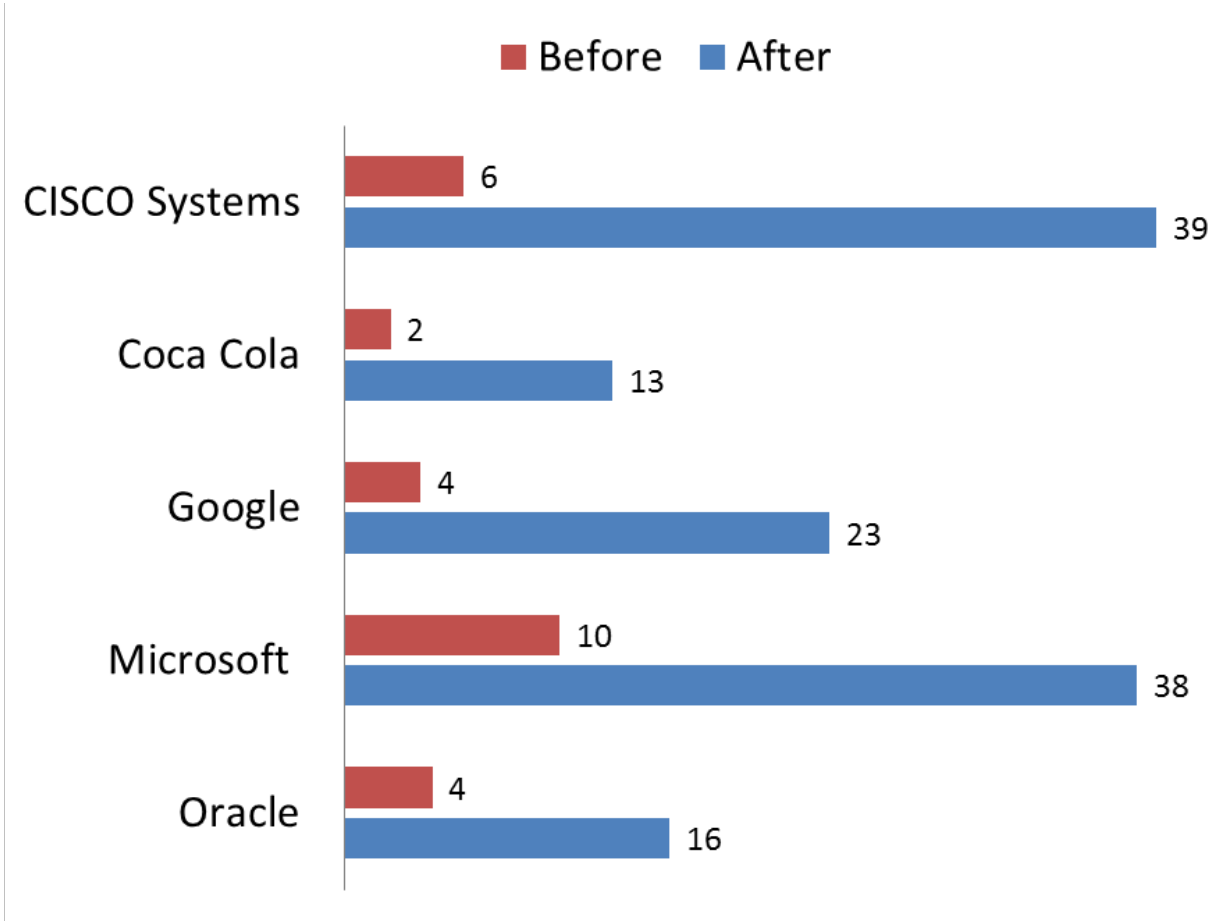

BMW driver at Hampton Inn


Tesla driver at Holiday Inn


Toyota driver at Ramada Plaza

Nissan Workplace and Fleet EV Vehicle/Charging Efforts

Average per Month Nissan LEAF Adoption Before & After Nissan EV Workplace Initiative



Over **20,000 LEAF** sales can be attributed to workplace efforts

Nissan Workplace Charging Program: Process Overview

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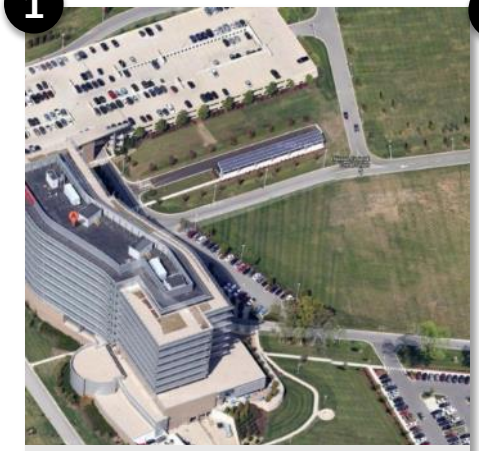


Management Kick-off Meeting

- Set goals
- Assess current & future charging needs
- Establish program timeline

2

LEAF Promotion

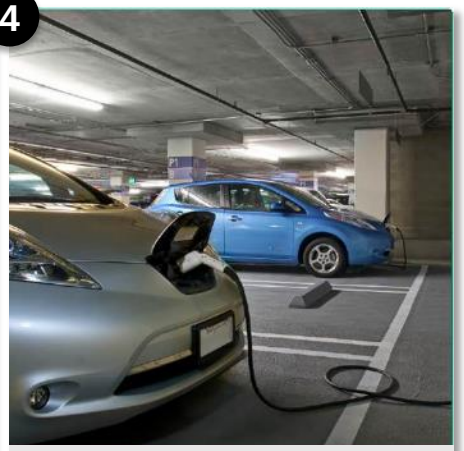
- Ride & Drive
- Educational Seminars
- Posting of LEAF on perks page

3

Infrastructure

- Perform site assessments
- Determine level of Nissan funding
- Order & Install chargers

4



Track & Evaluate

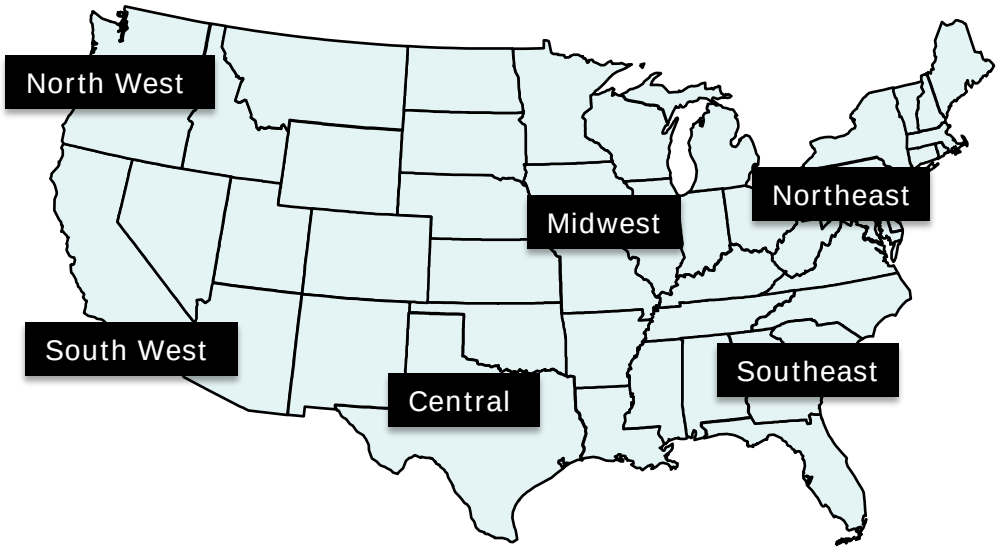
- Measure electric miles
- Track PEV adoption
- Continue promotional events

LEAF Business Development Managers

EV Business Development Managers (BDM) manage workplace and fleet programs in their respective regions

BDMs in 6 regions build B2B relationships with Fortune 500 companies, municipalities, states and utilities to offer:

- Special employee pricing for select companies (VPP), business affiliates
- Electric vehicle technology education seminars and workshops
- Vehicles for test drive opportunities
- EV charging equipment consultation and investment
- Extended VIP test drives for executives
- EV Fleet consultation and related EV fleet purchase incentives



Example: Partnership with City of New Bedford, MA

- Provided support on vehicle education
- Facilitated dealer interaction
- Provided L2 and DCFC equipment support to charge vehicles
- Working together on public DC Fast Charging