Identifying Infrastructure Needs for Growing the Electric Vehicle Market

Colleen Quinn
Vice President, Government Relations and Public Policy

NESCAUM Workshop – NY Auto Show

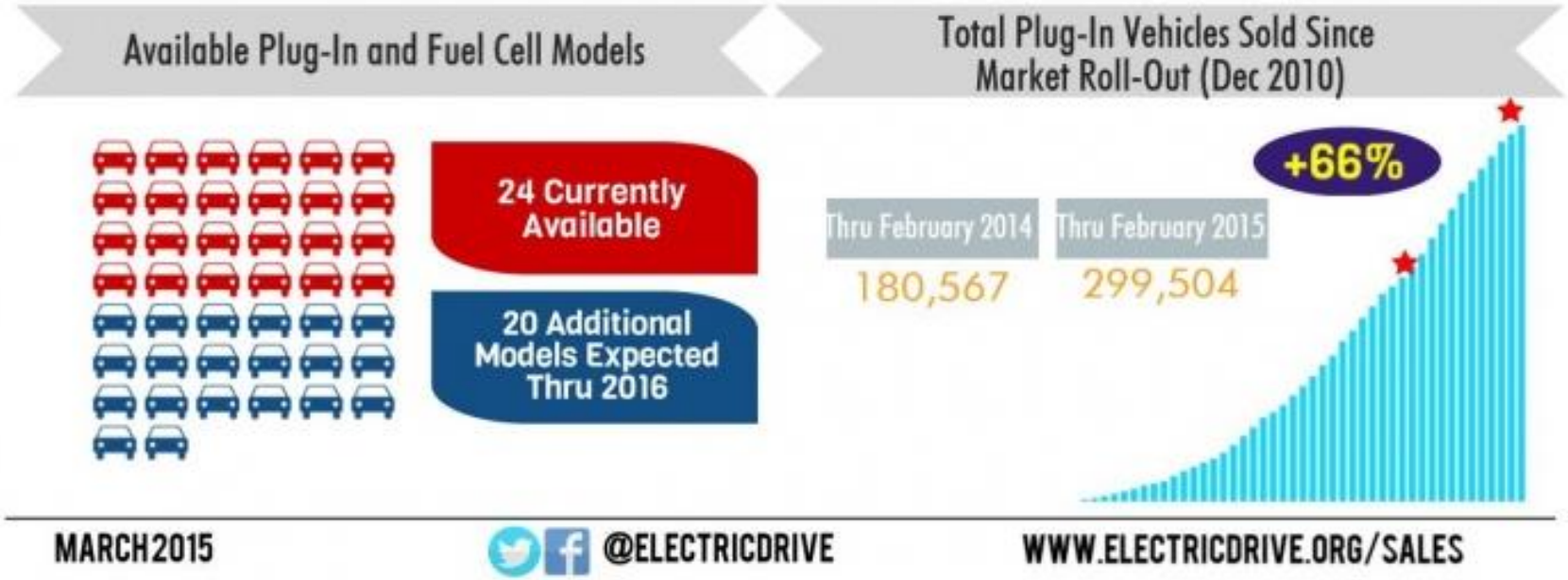
April 2, 2015

Agenda

1. Market Conditions
2. Driver Charging Behavior
3. Choosing L2 and DCFC
4. Charging for Charging
5. Next Steps for the Northeast

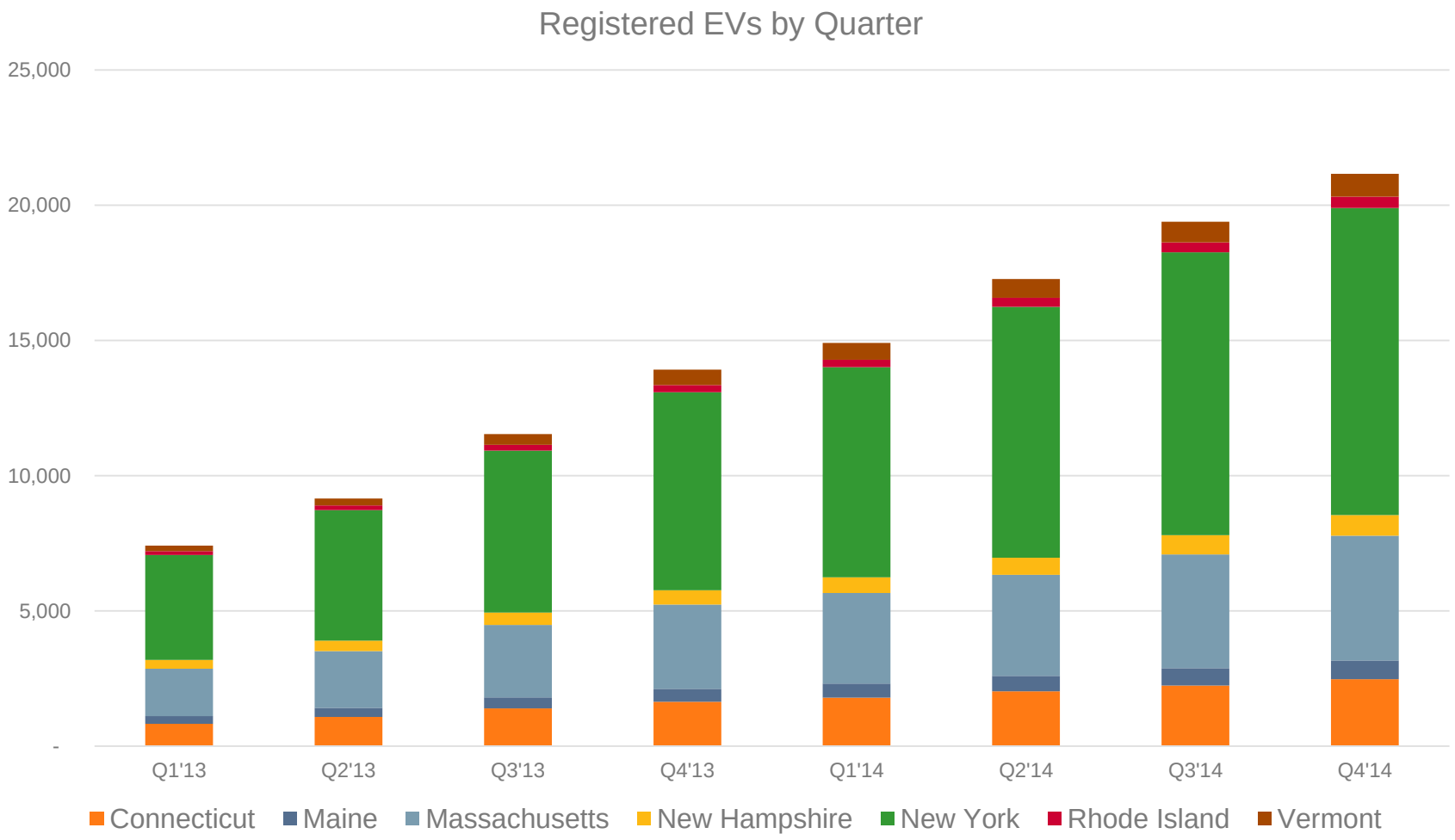
The Current Market for EV Charging

Cumulative U.S. Plug-In Vehicle Sales



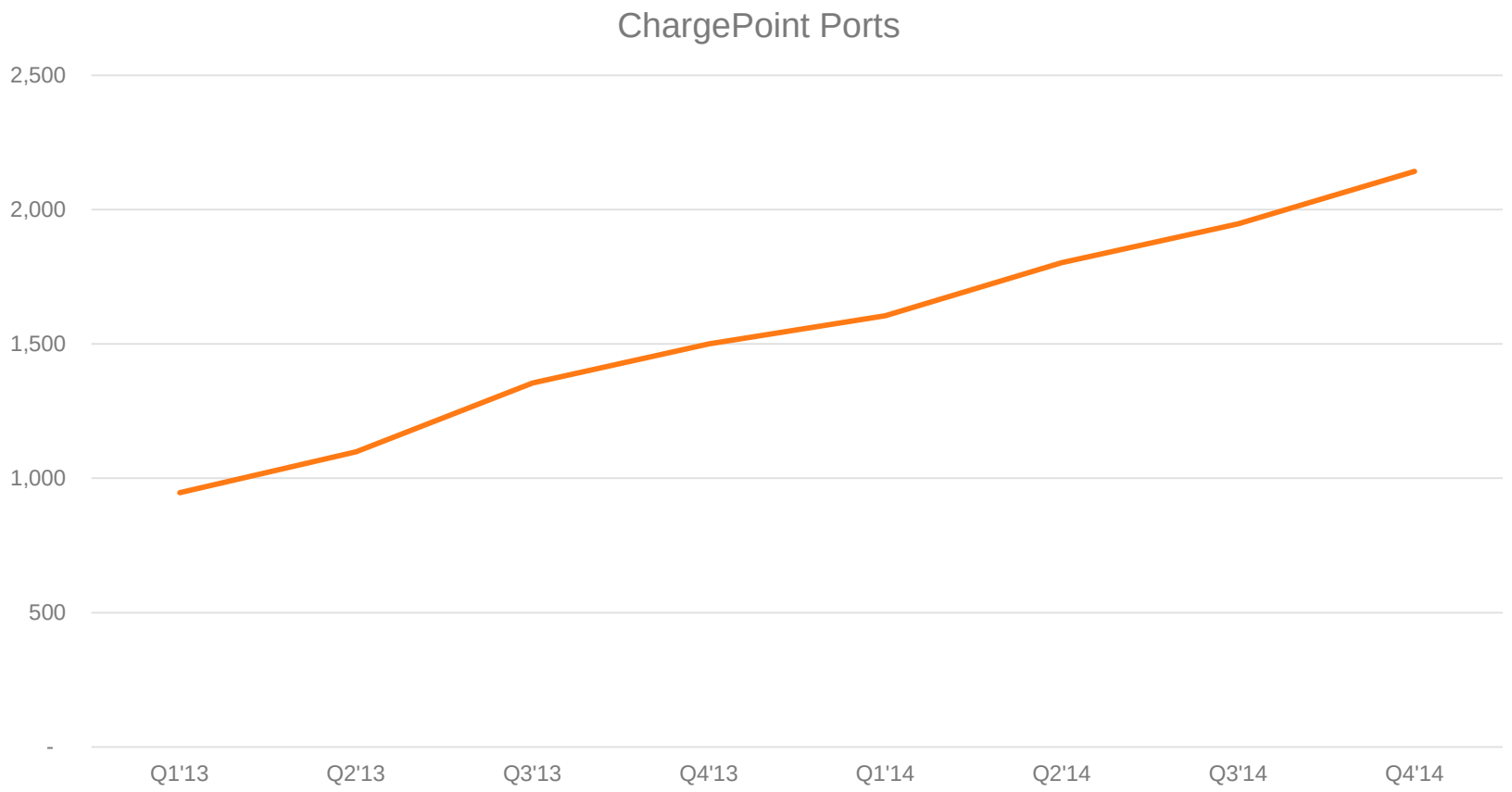
Sales figures sourced from HybridCars.com and direct reports submitted by EDTA member companies.

EV Sales Growth in New England

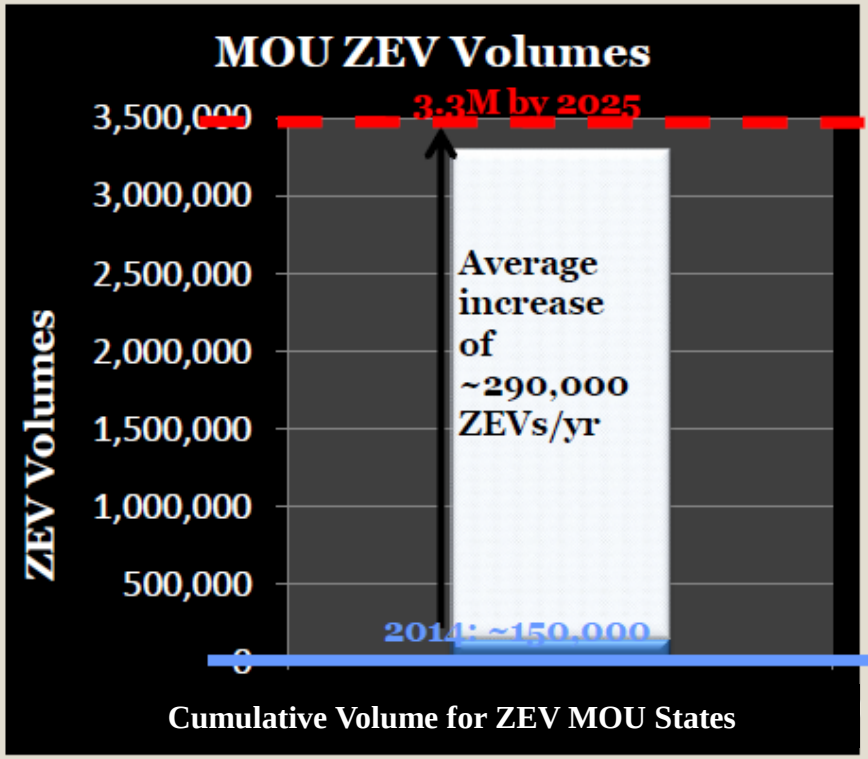


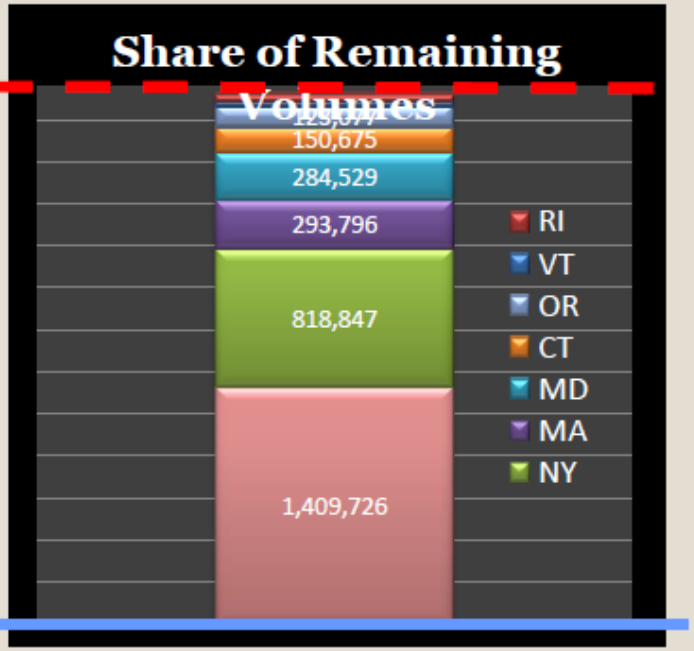
Source: RL Polk

ChargePoint Ports Installed in New England



ZEV MOU Volumes





Source: Alliance of Automobile Manufacturers; Association of Global Automakers

The Value of Smart Charging: Collecting Data to Analyze Driver Behavior

The ChargePoint Network

+ **21,275** charging locations in the US

ChargePoint Facts

We have the
Drivers

6 seconds
Drivers plug in every 6 seconds

140,000
EV drivers on the ChargePoint network

8,750,000
charges delivered

We have the
Network

70%+
market share

21,275
charging spots

4,000+
businesses

We've made a
Difference

55,000,000
pounds of CO_2 avoided

7,500,000
gallons of gas avoided

188,570,000
gas-free miles driven

Charging Behavior Data

ChargePoint data collected over a 90-day period ending in Feb 2015.

U.S. Total

Category	Average Session Length (mins)	Average Energy per Session (kWh)	Average kWh/Port/Day	Average Sessions/Port/Day
Commercial Parking	308	9.30	3.08	0.36
HealthCare	242	7.79	3.00	0.38
Hospitality	303	11.99	2.54	0.25
Multi-Family (Apartment,Condo)	355	10.33	4.29	0.42
Municipal Parking	246	8.04	3.28	0.39
Restaurant	171	10.46	1.89	0.21
Shopping Mall	120	5.08	3.05	0.56
Shopping Plaza	117	5.57	2.55	0.42
Standalone Retail	113	4.86	2.36	0.56
University/College	244	7.92	3.12	0.39
Workplace (Commercial)	295	8.38	4.34	0.52
Workplace (Government)	292	7.95	2.72	0.34
Grand Total	**246**	**8.15**	**3.16**	**0.40**

New York

Category	Average Session Length (mins)	Average Energy per Session (kWh)	Average kWh/Port/Day	Average Sessions/Port/Day
Commercial Parking	347	15.22	2.55	0.17
HealthCare	231	6.90	1.76	0.26
Hospitality	238	11.07	1.37	0.12
Multi-Family (Apartment,Condo)	423	17.54	3.52	0.20
Municipal Parking	318	6.34	2.43	0.38
Restaurant	96	6.90	0.19	0.03
Shopping Mall	103	4.91	1.58	0.32
Shopping Plaza	86	4.63	1.12	0.24
University/College	231	6.93	1.75	0.25
Workplace (Commercial)	328	8.88	2.56	0.29
Workplace (Government)	464	10.32	1.90	0.18
Total	**261**	**9.06**	**1.88**	**0.22**

Choosing Level 2 and DCFC

Paradigm Shift:
Fueling when you arrive, not on the way there

Technology doesn't require a gas station model, so...

Drivers will want to **top-off** wherever they park

ChargePoint Level 2

ChargePoint Express

Commercial

Home

DCFC

Aligning Charging Solution to Driver Activity

ChargePoint Express

Level II Charging

Driver Activity	Parking Duration	Activity Examples
Road Trip	<30 minutes	+ Planned stop en route to a long distance destination: Weekend Travel, Intercity or Long Haul
Errands	<30 minutes	+ Short stops while out and about town to top-off battery: - Single shops, coffee shops, fast food
Shop	30 minutes to 2 hours	+ Replenish energy used to top-off batteries during longer stops around the town : - Shopping malls, etc.
Dine	1-4 hours	+ Sit-in Restaurants
Play	2-6 hours	+ Sports grounds, Golf clubs, Theater
Work	4-8 hours	+ Commuting to workplace
Sleep	>8 hours	+ Overnight charging while at home or at a hotel

- ChargePoint Express (44-50KW)
- ChargePoint Express (20-25KW)
- ChargePoint Express (20-25KW) OR ChargePoint Level II (3-7KW)
- ChargePoint Level II (3-7KW)

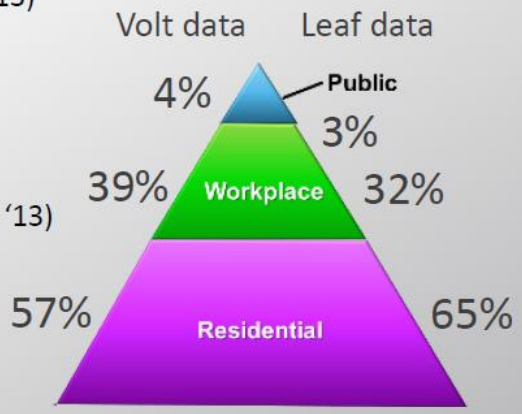
Data Shows EV Drivers Charge Mostly at Home and at Work

Home vs. Work vs. Public Charging

- Overall EV drivers:
  Study Period 1/1/2012 – 12/31/2013
  - 84% of all charging events are at home
  - 16% not at home

- When workplace charging is available to an EV driver:
  (96 Volts with access to workplace charging Jan '13 – Dec '13)
  - 57% of charging events are at home
  - 39% at work
  - 4% at other locations (e.g. public)

  (707 Leafs with access to workplace charging Jan '12 – Dec '13)
  - 65% of charging events are at home
  - 32% at work
  - 3% at other locations (e.g. public)



Residential and workplace charging provide the vast majority of all charging.

Source: John Smart, INL, EV Project; Link to all reports = http://avt.inel.gov/librarybydate.shtml

ChargePoint Home

- Wifi-enabled L2 charging that plugs into standard 240V outlet
- Schedule charging to minimize energy costs
- Start/stop charging sessions remotely
- Works with Nest Learning Thermostat™
- Won CA EPIC grant to develop cloud-to-cloud communication between drivers and utilities to optimize charging

Networked Solutions for Multi-Family Homes

MultiFamily Commercial Product

- Common parking areas with a few resident drivers
- Designed for frequent public use with multiple unique drivers
- **Property owner** pays for station, networked service, and maintenance

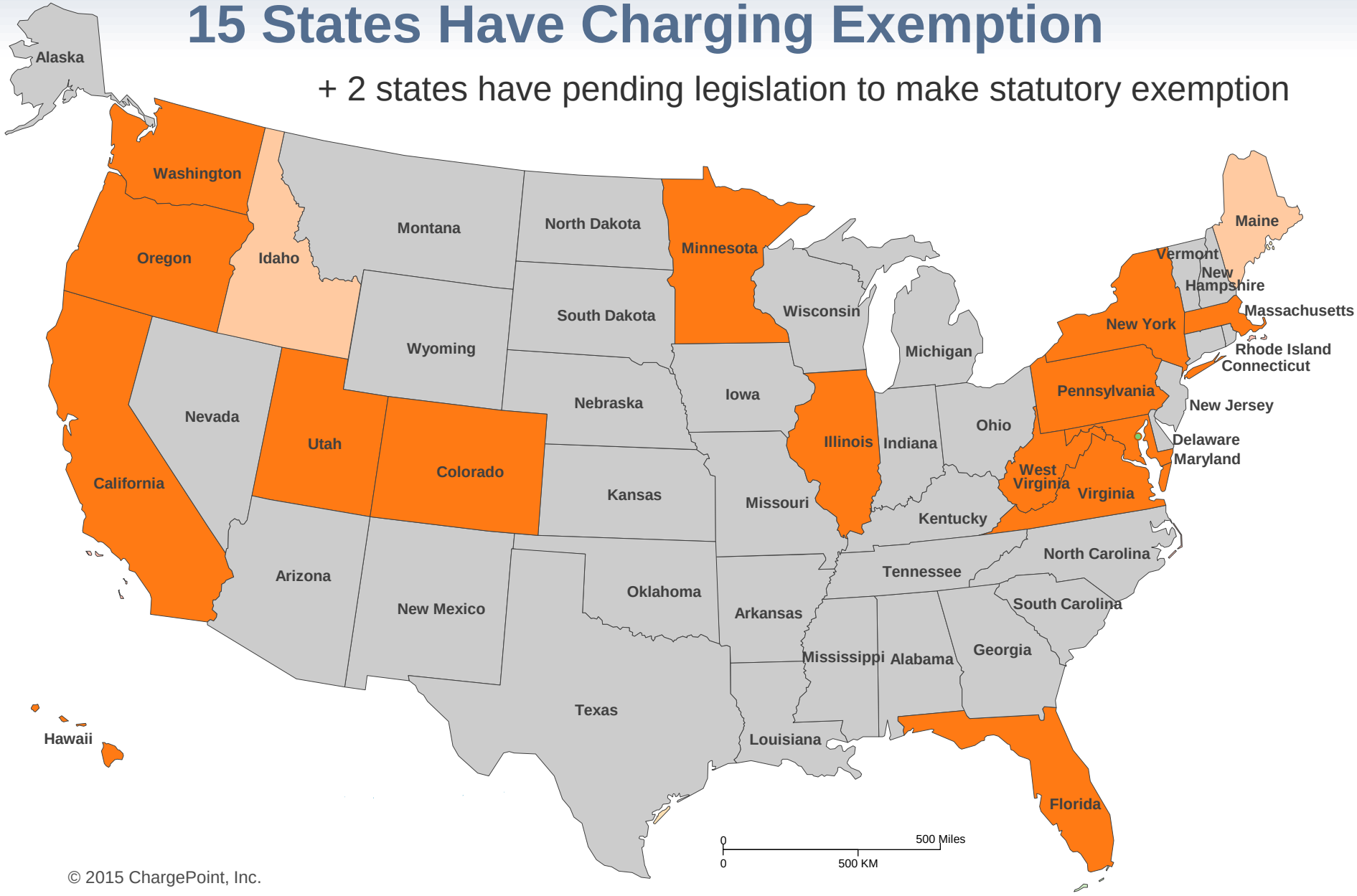
MultiFamily Home Service "Charging as a Service"

- Deeded, Assigned spots or too many EV drivers to share
- Dedicated charging station for each driver
- **Driver** pays monthly service, station with full-service maintenance is **included**

Setting Pricing for Charging

15 States Have Charging Exemption

+ 2 states have pending legislation to make statutory exemption



Benefits of Charging for Charging

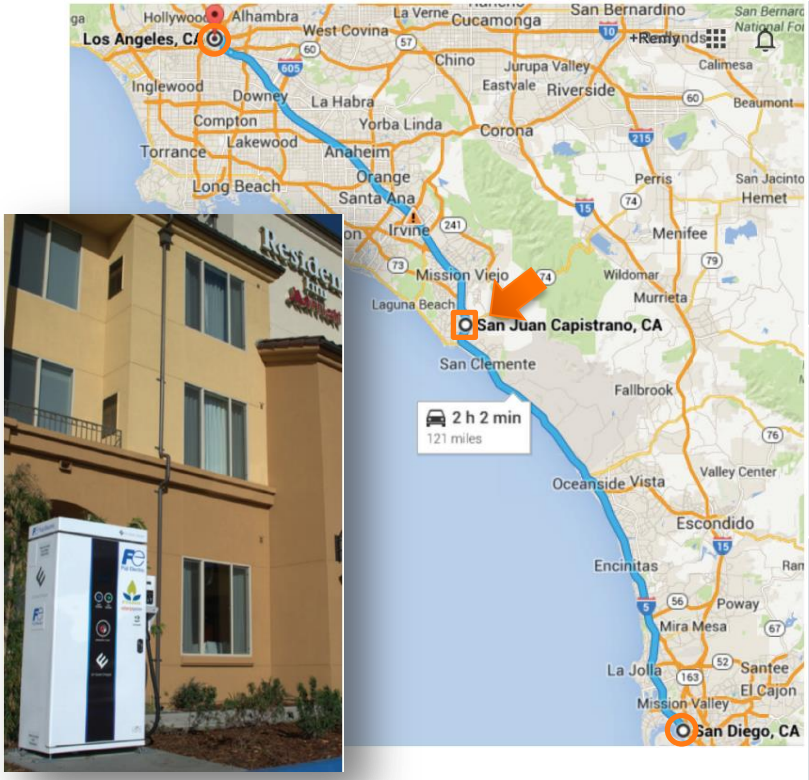
- Station owner can be compensated for cost of providing electricity for fueling.
- Drivers may be more motivated to charge just amount needed or park for shorter periods of time, allowing more vehicles to access that charging port.
- Station owner can set pricing models to encourage customer behavior. Examples:
  - Employers may offer different prices for charging to employees and guests.
  - Retailers may offer free charging to drivers that sign up for their loyalty shopper cards.

Charging Service Models

Business	Cost Plan	Value Prop
Workplace	Subsidized	$550/year to retain an employee
Workplace	Paid	Employee pays $2 a day
City	Cost recovery	Resident pays $1 a charge
Apartment building	Vending Machine	6 year payback, then $1000 a year income
Pure service provider	Subscription business	$60/month, 6 year payback
Hotel	Amenity	$550/year to attract guests
Retail	Amenity	$1 subsidy to bring in a customer

Case Study

+ How Evoasis generated over $10K in revenue and increased overall traffic for nearby businesses with their ChargePoint Express station, which became the most frequented fast charger in the country



Goals
+ Find a convenient location that would attract EV drivers
+ Determine a price point that would maximize utilization while keeping the station profitable
+ Prevent costly peak demand charges for utilities company
+ Select Fast DC charger that is easy to install with lower installation cost

Implementation
+ Installed Fuji's 25kW DC fast charger
+ Connected the station to the ChargePoint Express network
+ Worked with ChargePoint to determine optimal pricing scheme

Results
+ 2,900 charges in 1.5 years
+ Over $10,000 in revenue generated
+ $1,000/month projected revenue by January 2015
+ EV drivers patronize local business
+ Marriott Hotel achieves TripAdvisor's Green Leader status

Next Steps for the Northeast

What should states focus on going forward?

Policy Leadership

- Support vehicle incentives
- Advocate for smart charging
- Secure exemptions for ability to resell electricity
- Develop innovative financing models
- Write make ready into state and city building codes
- Streamline local permitting
- Protect renters and HOA rights
- Define a role for the utility

Defining a Role for Utilities: Collaboration is Key

- ChargePoint has nearly a decade of experience learning about what drivers and customers want.
- We believe that utilities should now be a part of deploying EV infrastructure.
- We will be working with utilities to leverage our respective expertise.

THE SACRAMENTO BEE

Utilities should help build electric vehicle charging network

By Pasquale Romano, ChargePoint CEO
November 14, 2014

Electric vehicles are a reality and the future. Today there are more than 250,000 – 100,000 of them in California – and estimates say we'll have 3.2 million nationally by 2020. Electric vehicles are not only revolutionizing what we drive, but also drastically reducing carbon emissions and reducing our dependency on foreign oil.

To continue this sea change, we need to keep finding solutions that will make EV charging more accessible to every Californian. While there are 19,000 charging locations on the ChargePoint network, the demand has grown exponentially. To accelerate the transition to fueling with electricity, we believe investor-owned utilities should take a larger role.

California IOU EVSE Applications

chargepoint

	PG&E EV Program	SDG&E VGI Pilot	SCE Charge Ready
# of Charging Stations	25,100	5,500	30,000
Total Pilot Cost	$654 million	$103 million	$355 million
Program Cost per Port Installed	$26,056	$18,727	$11,833
Length of Pilot	5 yrs	4 yrs for installations; 10 yrs total of data collection	5 yrs - Phase 1 is one year (1500 stations) then after a PUC review process, Phase 2 would last 4 yrs
Technology	L2 and DCFC	L1 and L2	L1 and L2
Installation Costs	Utility	Utility	Utility
Hardware Ownership	Utility	Utility	Host
Hardware Costs	Utility	Utility	Host and Utility (SCE will offer a rebate to cover a portion - but not all - of hardware cost)
Network Ownership	Utility	Utility	Host
Hardware and Network Chosen Together?	No, separate RFPs	Yes	Host has choice
Station Maintenance	Utility (for length of pilot and then if approved within General Rate Case beyond 2022)	Utility will contract with a third party to maintain the stations	Host must agree to maintain stations for 10 years
Pricing (for the Driver)	Time variant pricing (to be separately approved by CPUC)	Drivers will use a mobile app to schedule charging one day ahead based on pricing and quantity (hours) needed.	Host has flexibility to set pricing
Energy Costs (for the Station)	Network partner will be PG&E customer of record; will buy electricity from utility and resell to customer	SDG&E will bill drivers directly to their home energy bill for the electricity they consume at the stations. (Charging stations are only available for use by SDG&E customers.)	Host will pay energy costs (along with their regular energy bills) and will be on TOU rate
Load Management Features (sequencing, etc.)	Not included	Not included	Encouraged but not required (and chosen by Host)
Access Controls (such as employee-only)	Utility will evaluate in network partner RFP	Access is determined by the utility and limited to SDG&E customers only.	Host has choice
Locations of Stations	Public locations, workplace, MUDs	Workplace and MUDs	Public locations, workplace, MUDs
Vendor Selection Process	RFP at beginning of pilot	Two step RFI and then RFP process to select one vendor for entire project	Rolling vendor registration process (allows new vendors/products to be added during pilot)

The Ideal Role for Utilities

- Invest in “make-ready” (electrical infrastructure needed up to the charging station) and the installation costs of EVSE (more than 50% of the total cost of a charging station)
- Provide funding solutions for charger and network costs such as rebates but do not seek to cover the entire cost of the equipment and services; “skin in the game” is necessary for chargers to go where demand truly exists
- Allow technology to evolve by preserving customer choice on hardware, features and network services. Utility can set minimum requirements (such as load management capabilities) and maintain a qualified vendor list but the list of approved vendors should remain open via a rolling certification program
- Utilities can own infrastructure however host must have some control, including the ability to set pricing and access control

Thank You

Colleen Quinn
colleen.quinn@chargepoint.com