THE SILICON VALLEY VIEW

WHITEPAPER

# ELECTRICITY

*E-mobility – why things that work in Silicon Valley are not succeeding elsewhere.*


THE SILICON VALLEY VIEW
01/18
OSK @ SILICON VALLEY

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By Christoph Reifenrath

# THIS MORNING IN SAN JOSE



A totally normal scene at a stoplight – waiting neatly in line in front of me are a Toyota Prius, a Nissan Leaf, a Tesla Model 3, a Honda Clarity with fuel cell drive, another Tesla, this time a Model S, and a Toyota Prius plug-in hybrid. It would appear at first sight that “alternative” drives really are an everyday occurrence here. But does that impression match the objective facts?

# THE GOLDEN STATE

2011

**269.000** = **48 %**

PLUG-IN E-VEHICLES SOLD — OF U.S. PLUG-IN E-VEHICLES

2016

ELECTRIC-DRIVE VEHICLES AS A PROPORTION OF NEW REGISTRATIONS

| 10 % | 6 % | 4 % |
|---|---|---|
| SAN JOSE | SAN FRANCISCO | LOS ANGELES |

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A comprehensive study published in May 2017 by the International Council on Clean Transportation ICCT provides the first detailed picture of the status quo. It shows that, by the end of 2016, around 48% of U.S. electric vehicle sales had occurred in California, although it accounts for just 12% of the American population. Total sales of e-vehicles (plug-in hybrids and all-electric vehicles) from the start of 2011 through 2016 amounted to approx. 269,000 units.

California also stands out by a long way in a comparison of all U.S. electric vehicle markets. The Golden State is home to six of the USA's 50 largest metropolitan areas based on population. All six of these were among the top eight electric-vehicle markets in 2016. While electrically powered vehicles made up around just one percent of the total national market in 2016, they already had a market share of ten percent in San Jose, six percent in San Francisco and four percent in Los Angeles, making them the USA's three largest electric vehicle markets.

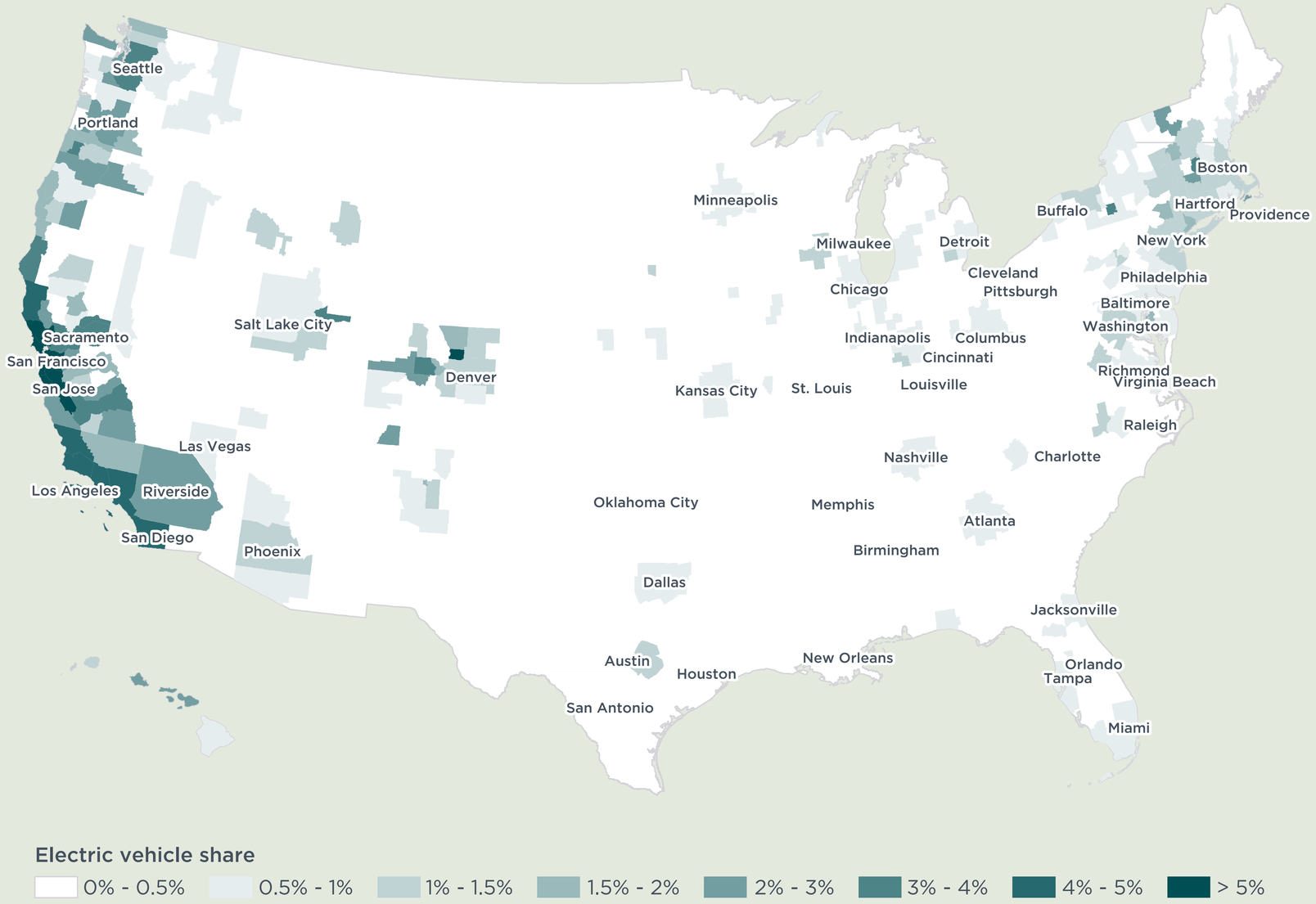
Sales of electric vehicles in California as a whole averaged 4.5 percent in 2016. Inhabitants of the Los Angeles metropolitan area bought or leased around 30,000 new electric vehicles in 2016, equating to approx. one fifth of the overall American e-vehicle market. Total sales of electric vehicles from 2011 through 2016 added up to more than 100,000 units.

# SHARE OF PLUG-IN E-VEHICLES IN THE 50 LARGEST U.S. METROPOLITAN AREAS

(SOURCE OF REGISTRATION FIGURES: IHS AUTOMOTIVE)

In 2017, i.e. one year later, the share of sales attributable to electric vehicles remained at its highest in the key west-coast markets. The San Jose region took first place once again at 13 percent, followed by other parts of California, with shares ranging from eight to five percent.

Top markets in Colorado, Oregon, New Hampshire, New York and Washington achieved shares of three to five percent. Overall, the share of new electric vehicles in the 50 most populous regions now stands at 1.6 percent and exceeds the rest of the USA by a factor of 2.5.



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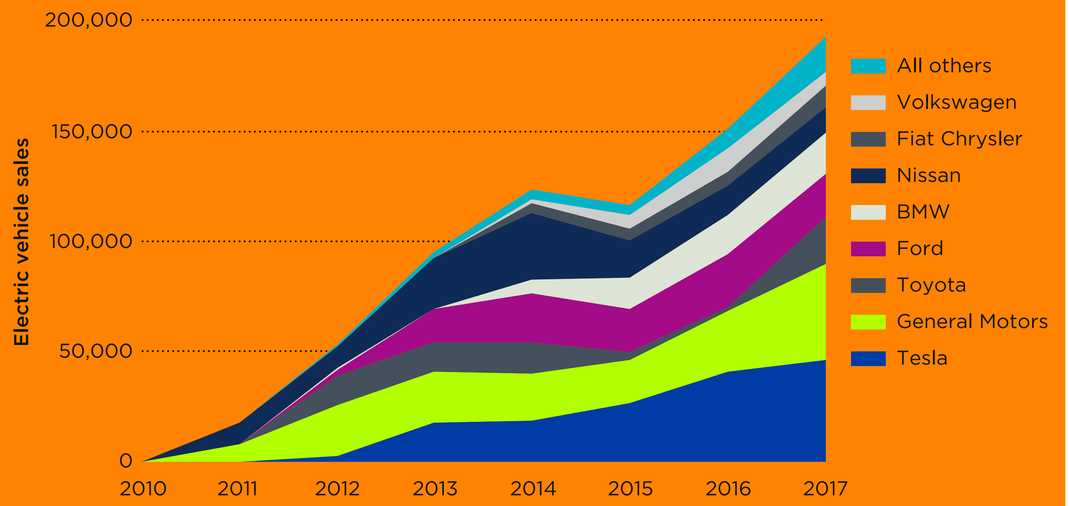
# SALES OF PLUG-IN E-VEHICLES IN THE USA BY MANUFACTURER (2010-2017)

(SOURCE: THE CONTINUED TRANSITION TO ELECTRIC VEHICLES IN U.S. CITIES / ICCT)




## THE FOUR BEST-SELLING MODELS

CHEVROLET BOLT

CHEVROLET VOLT

TOYOTA PRIUS PRIME (PHEV)

TESLA MODEL S

The diagram clearly shows that 92 percent of the electric-vehicle market in the USA is held by just eight automakers. The four best-selling models were the Chevrolet Bolt and Chevrolet Volt, Toyota Prius Prime (PHEV) and Tesla Model S with sales of more than 20,000 units each. In 2017, electric-vehicle sales rose again from 150,000 in 2016 to more than 190,000, marking growth of around 29 percent.

But what is driving this Californian dominance – aside from sheer purchasing power, which is surely a not inconsiderable factor in the success of still comparatively expensive e-vehicles?
According to the ICCT, the continual growth of the electric-vehicle market calls for measures by a number of different players. It identifies as factors the loosening of consumer constraints by local, state and supply companies as well as political initiatives, incentives and awareness campaigns. The ICCT cites California's Zero Emission Vehicle program as an additional market catalyst, promoting marketing efforts by automakers and simultaneously increasing the availability of electric models. This safeguards a growing market and, in the best-case scenario, is supported by sustained infrastructure investments.

# ACTIONS TAKEN BY SELECTED U.S. METROPOLITAN AREAS FOR PROMOTING E-VEHICLES (2017)

(SOURCE: THE CONTINUED TRANSITION TO ELECTRIC VEHICLES IN U.S. CITIES / ICCT)

| | STATE ACTION | | | | | | | | | | | | | | LOCAL ACTION | | | | | | | | | | | | | | | UTILITY ACTION | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| METROPOLITAN AREA | State ZEV program | State International ZEV Alliance participation | State low carbon fuel policy | State BEV purchase incentive | State PHEV purchase incentive | State increased incentive for low-income | State fee reduction or testing exemption | No state annual electric vehicle fee | State private charger incentive, support | State public charger promotion | State parking benefit | State fleet purchasing incentive | State manufacturing incentive | State allows direct sales to consumers | City electric vehicle strategy | Streamlined EVSE permitting process | EV-ready building code | City vehicle purchase subsidy | City parking benefit | City EVSE incentive, support | City carpool lane (HOV) access | City-owned EV chargers | Workplace charging | City electric carsharing program | City informational materials | City outreach events | City outreach events in low-income communities | City electric vehicle fleet target | City electric buses in public transportation | Utility charging pilot or other research | Utility public charging infrastructure | Utility public charging infrastructure in low-income communities | **Utility time of use rates offered** | Utility preferential EV rates | Utility EV or EVSE incentive, support | Utility increased incentives for EVSE at multifamily properties | Utility info materials or outreach events | Utility EVSE informational materials for multifamily properties | Utility cost comparison tool | Utility electric vehicle fleet | TOTAL ACTIONS (OUT OF 40) |
| Los Angeles | X | X | X | X | X | X | | X | X | X | X | X | X | X | X | X | X | | | | X | X | X | X | X | X | X | X | X | X | | X | X | X | | X | X | X | X | 34 |
| Sacramento | X | X | X | X | X | X | | X | X | X | X | X | X | X | | X | X | | X | | X | X | X | X | X | X | X | X | X | X | | X | X | X | X | X | | X | X | 34 |
| San Francisco | X | X | X | X | X | X | | X | X | X | X | X | X | X | X | X | X | | | | X | X | X | X | X | X | X | X | X | X | X | | X | X | X | | X | | X | X | 34 |
| San Jose | X | X | X | X | X | X | | X | X | X | X | X | X | X | X | X | X | | X | | X | X | X | | X | X | | X | | X | X | X | X | X | | X | | X | X | 32 |
| Riverside | X | X | X | X | X | X | | X | X | X | X | X | X | X | X | X | X | X | | | X | X | X | | X | X | | | | X | X | X | X | X | | X | X | X | X | 31 |
| San Diego | X | X | X | X | X | X | | X | X | X | X | X | X | X | X | X | X | | | | X | X | X | | X | X | | X | | X | X | X | X | X | | X | | | X | 29 |
| New York | X | X | | X | X | | X | X | X | X | | X | | X | X | X | X | | X | | X | X | X | X | X | X | | X | | X | | | X | X | | X | | X | | 26 |
| Portland | X | X | X | X | X | | X | | X | X | | X | | X | X | X | | | | | | X | X | X | X | X | X | X | X | X | X | | | X | | | X | | X | X | 26 |
| Boston | X | X | | X | X | | X | X | X | X | | X | | X | | | X | | X | | | X | X | X | X | X | | | X | X | | | X | | | X | | X | X | 23 |
| Denver | | | | X | X | | X | | X | X | | X | | X | X | | X | | X | | | X | X | X | X | X | X | X | X | X | | | X | | | X | | X | X | 23 |
| Seattle | | | | X | X | | X | | X | X | | X | X | X | X | X | | X | | | | X | X | X | X | X | | X | X | X | | | | | | X | X | X | X | 23 |
| Baltimore | X | X | | X | X | | X | X | X | X | | X | | X | | | | | | | | X | X | | X | X | X | X | X | X | | | X | X | | | | X | | X | 22 |
| Atlanta | | | | | | | X | | | X | | | X | X | X | X | | | | | X | X | X | | X | X | | X | | X | X | | X | X | X | | X | X | X | X | 21 |
| Philadelphia | | | | X | X | | | X | | X | | X | | X | X | | | | X | | | X | X | X | X | X | | X | X | X | | | X | | X | | | | X | 20 |
| Austin | | | | | | | X | X | | | | | | | X | | | | X | | | X | X | | | X | X | X | | X | X | | X | X | X | X | X | X | X | X | 19 |
| Raleigh | | | | | | | X | | X | X | | X | | X | X | X | | | X | | X | X | X | | X | X | X | | | X | | | X | | | | X | | | X | 18 |
| Washington | | | | X | X | | X | X | X | X | | X | | X | X | | | | | X | X | | X | X | | X | | | | | | | X | | | | X | | | X | 17 |
| Charlotte | | | | | | | X | | X | X | | X | X | | X | X | | | | | X | X | X | | X | X | | | | X | | | X | | | | X | | | X | 16 |
| Chicago | | | | | | | X | X | | | | | X | X | | X | | | | X | | | X | X | X | X | | | X | | | | X | | | | X | X | X | X | 16 |
| Hartford | X | X | | X | X | | X | X | | X | | X | | | | | | | | | | X | X | | | X | | | | X | | | X | | | | X | | X | X | 16 |
| **Buffalo** | X | X | | X | X | | X | X | X | X | | X | | X | X | | | | | | | | X | X | | | | | | | | | X | | | | X | | | | 15 |
| Houston | | | | | | | X | X | | | | | | | X | X | | | | | | X | X | X | X | X | | X | | | | | X | | | | X | | X | X | 15 |
| Indianapolis | | | | | | | | X | | | | | X | X | X | | | | | | | X | X | X | | X | | X | X | X | X | | X | X | | | X | | | | 15 |



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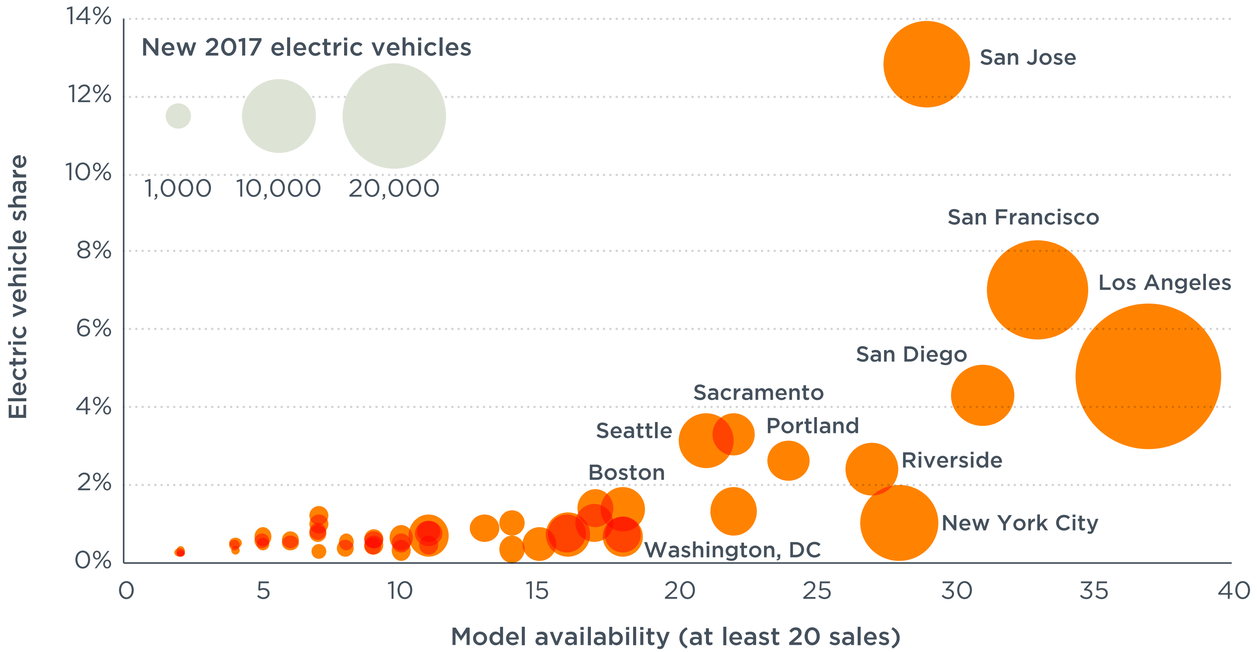
# SALES SUCCESS OF ELECTRIC VEHICLES CORRELATES DIRECTLY WITH THE NUMBER OF MODELS AVAILABLE

According to the ICCT, the availability of more models in more vehicle segments, especially those at lower price points and with greater range, is one key to the further development of the electric-vehicle market. The five biggest markets for electric vehicles, accounting for almost half of all electric vehicles sold in the USA, provided consumers with a choice of a least 28 available e-vehicle models. In the remaining U.S. markets, however, around half of the population has access to just ten or fewer electric models.




Correlation between e-vehicle model availability and market share in the 50 U.S. metropolitan areas (source: The continued transition to electric vehicles in U.S. cities / ICCT)

# HOW TO PUT MORE E-CARS ON THE ROADS …



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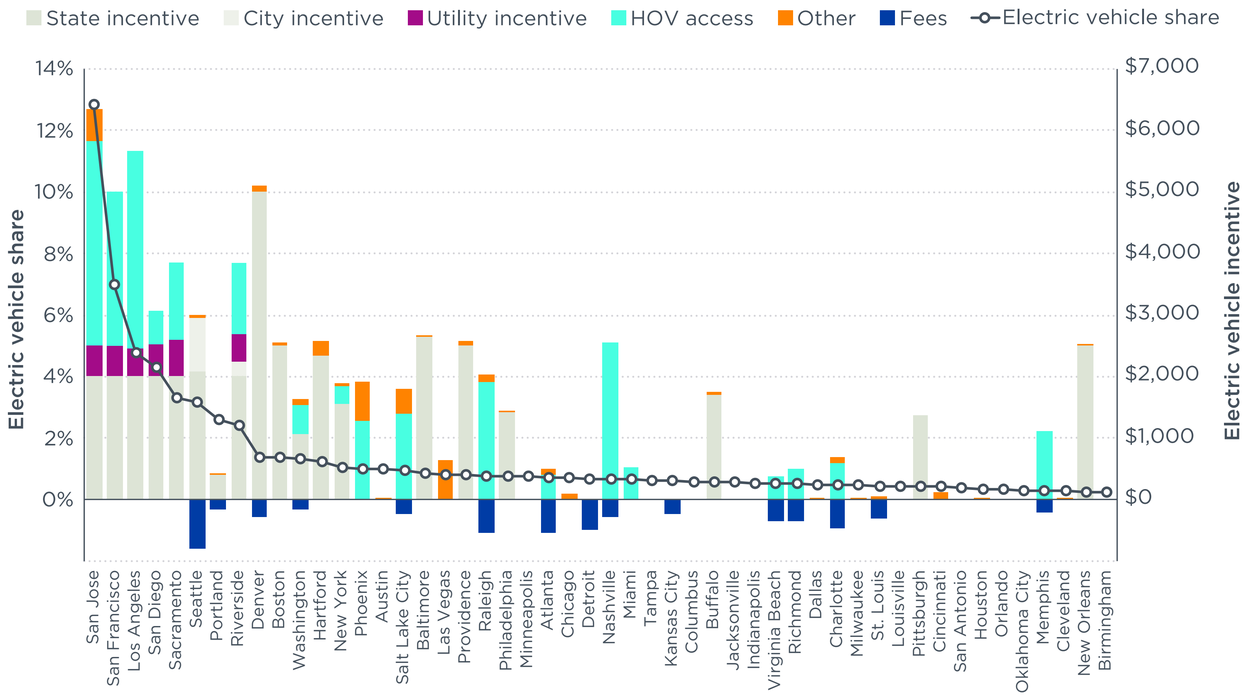



Correlation between e-vehicle market share and financial incentives in the 50 U.S. metropolitan areas in 2017 (source: IHS Automotive)

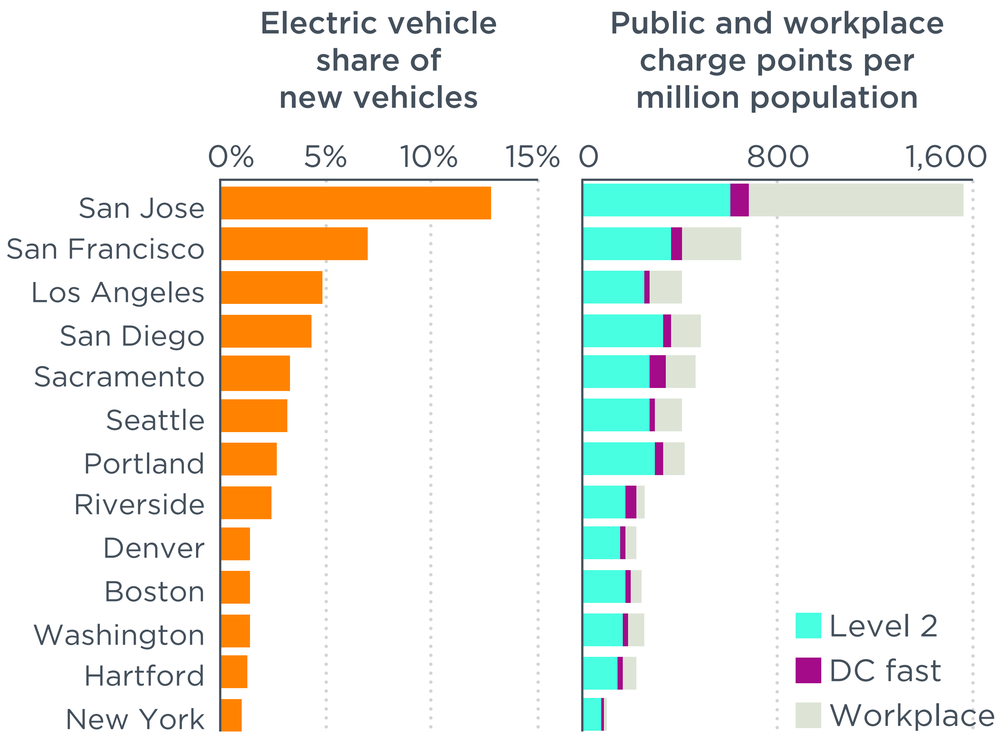
# CONSUMER INCENTIVES REMAIN IMPORTANT – EVEN IF THE COST OF ELECTRIC VEHICLES CONTINUES TO FALL

The price point for electric vehicles has fallen while range has increased, reflecting the significant progress in battery technology. However, increased use of electric vehicles continues to require financial sales incentives that reduce the effective cost of electric vehicles. During 2017, there were substantial consumer incentives amounting to between $2,000 and $5,000 in nine of the USA's top ten e-vehicle regions.

# ELECTRIC-VEHICLE MARKET AND CHARGING INFRASTRUCTURE GROW ONLY IN PARALLEL

Markets with a higher distribution of electric vehicles had at least 300 publicly accessible charging points per million people. In contrast, half of the U.S. population live in a market with a charging infrastructure at least 70 percent below this benchmark. Figures indicate the proportion of rapid charging stations in the strongest e-vehicle markets stands at roughly ten to 20 percent. Furthermore, the top electric vehicle markets generally have at least 100 workplace charging stations per one million inhabitants.

In this respect, San Jose is once again leading the pack by a substantial margin. In 2017, the region offered approx. 17 times more public charging points per head than Oklahoma City. With more than 800 workplace charging stations per one million inhabitants, it holds the number one spot here, too. The markets with the next-highest availability of workplace charging points, at around 100 units per one million inhabitants, are San Diego, Los Angeles, Sacramento, Detroit and Kansas City.




Correlation between e-vehicle model availability and charging stations in the 50 U.S. metropolitan regions in 2017 (extract) (source: The continued transition to electric vehicles in U.S. cities / ICCT)

# FLEET INTEGRATION OF ELECTRIC VEHICLES DIRECTLY INCREASES E-VEHICLE SALES

As part of a strategy to raise public visibility of the technology, Massachusetts has been offering incentives for fleet use of electric vehicles since 2014. Public bodies such as municipal administrations, public universities and state agencies have the right to incentives of up to $5,000 per PHEV, $7,500 per BEV and $10,000 for double charging stations.

Colorado and other states are expanding fleet incentives for public and private bodies. Local carsharing program BlueIndy in Indianapolis is expanding toward 500 all-electric Bolloré Bluecars with 200 charging points. Carsharing programs like Maven by General Motors, ReachNow by BMW, Enterprise and other services have integrated electric vehicles into their fleets.

A few cities are working toward launching special programs for electric car-sharing in low-income communities frequently subject to greater socio-economic challenges and environmental pollution. The biggest of those is running in Los Angeles, with 100 electric Bolloré Bluecars and 200 charging stations.

# KNOWLEDGE SELLS E-CARS

According to the ICCT, consumer awareness and understanding is the critical precursor to market growth for electric vehicles. Despite all previous initiatives, the broader U.S. public still lacks fundamental knowledge of electric vehicles. Awareness campaigns including online information material and information events would help raise familiarity and the general understanding of electric vehicles and their features.

The city of Boston, for instance, has a particularly informative website containing information and additional links on electric vehicles, their economical and ecological benefits, a cost-saving calculator, a buying guide, information on upcoming driving events, a map of available public charging stations, information on the city's EV policies and available incentives.

Research carried out by the California Plug-in Electric Vehicle Collaborative (PEVC, 2017) has also established that nine percent of those polled had bought or leased an electric vehicle within three months following a test drive.

# QUINTESSENCE

Growing model diversity, financial incentives for customers, a well-developed (charging) infrastructure as well as an intensive information policy and extensive public relations are the main drivers for the acceptance of electric mobility.

Those who know the benefits of electric cars tend also to buy or lease them. As many as nine percent within three months following a test drive.

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# USEFUL LINKS:

California State ZEV Program –
Zero Emission Vehicle Program

International ZEV Alliance, Multiple State participation –
Zero Emission Vehicle Alliance

California State Low carbon fuel policy –
Low Carbon Fuel Standard

California State Increased incentive for low-income consumers –
Clean Vehicle Rebate

California State Annual electric vehicle fee –
Zero-emission vehicle fee beginning 2020

California State Manufacturing incentive –
Sales and Use Tax Exclusion Program

Local Riverside, California City Vehicle purchase subsidy–
Alternative Fuel Vehicle Rebate Program

San Diego California Utility public charging
infrastructure in low-income communities –
SDG&E To Install Thousands of EV Chargers

San Francisco, California Electric vehicle fleet –
PG&E to Step Up the Addition of Electric Vehicles to its Fleet

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