

All Roads Lead to e-Mobility

Insights from 10 Years of Electric Vehicle Charging Data



“By 2040, 54% of new car sales and 33% of the global car fleet will be electric.”

Electric Vehicle Outlook 2017,
Bloomberg New Energy Finance

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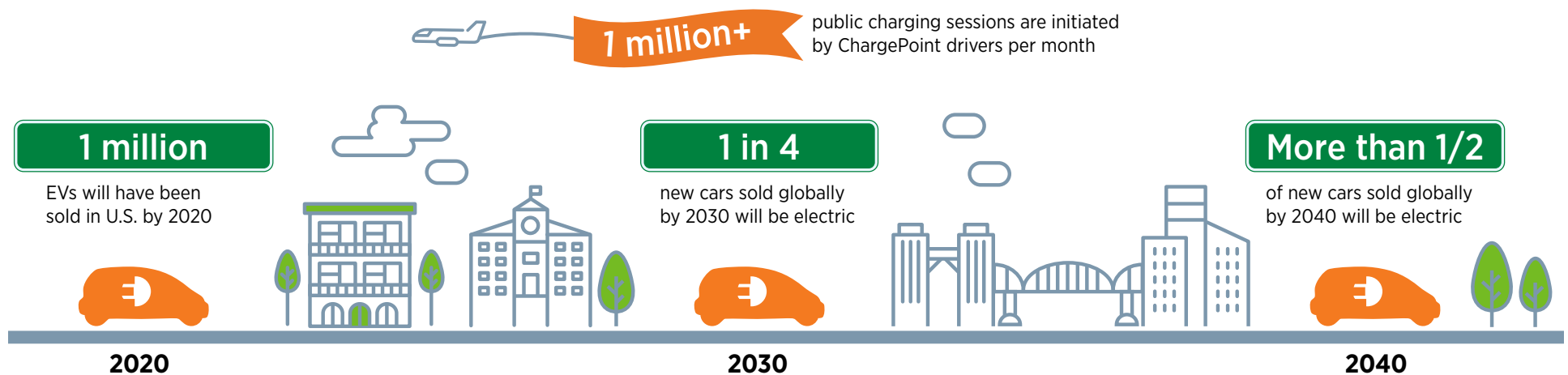
EV Adoption Is Accelerating. Let's Go!

In many U.S. cities, electric vehicles (EVs) are a common sight on roads and in parking lots. And the growth of EV adoption is accelerating. The U.S. will reach one million EVs sold within two years. Approximately one in four new cars sold by 2030 will be electric, and by 2040, more than half will be EVs.¹ Soon, the default car will be an EV that charges whenever it's parked, whether that's at home, at work, around town or on a road trip.

New charging stations are popping up in garages, workplaces, schools, hospitals, shopping centers, town centers, bus and fleet depots, and everywhere else vehicles are parked. Already, ChargePoint drivers initiate

more than one million public charging sessions per month, and that number is growing. "Topping off"—charging for a short time to add range to your partially full battery—will soon be as much a part of the vernacular as "filling up."

In the 2017 edition of the Charging Forward report, we take a deeper dive into how EV charging is evolving to support everything from passenger cars to buses. We also peek into the crystal ball to share what we think is ahead for fleets, autonomous vehicles, and more.



¹ Electric Vehicle Outlook 2017, Bloomberg Energy Finance.



1 EV Sales Blast Off

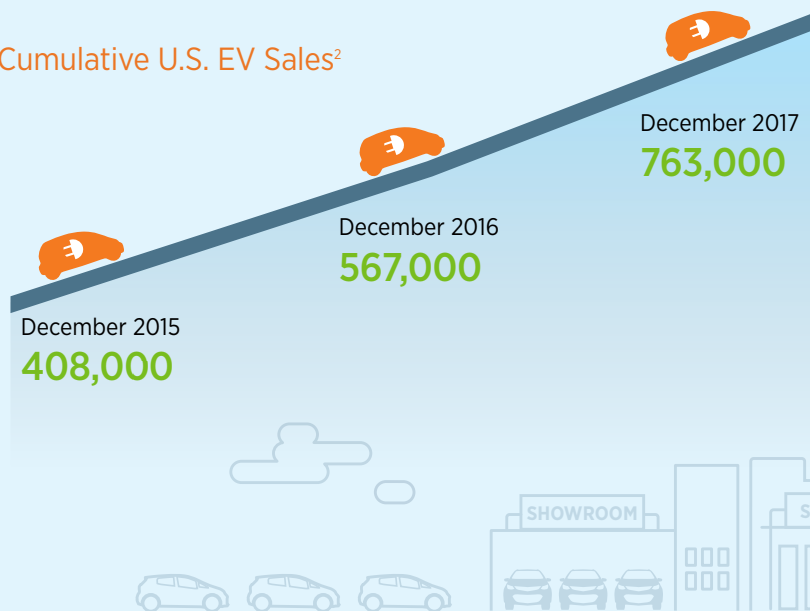
EV Sales Keep Accelerating

Most projections suggest EVs are on track to becoming the predominant way the world moves people and goods, and recent sales growth figures bear this out. 2017 was a record year for EV sales. Major automakers are betting that this seismic shift in driving habits will continue and are rapidly introducing EV models with appealing new features.

2017 was a record year for EV sales, and automakers are rapidly introducing EV models.

The Rise of EVs

Cumulative U.S. EV Sales²



Increase in U.S. EV Sales²

December 2015 to December 2016

+159,000

December 2016 to December 2017

+196,000

ChargePoint Public
Charging Sessions
per Month

1 million



²Baum & Associates and InsideEVs.com data through December 2017. Select model sales are estimated.

Why Do People Drive Electric?

From the tech-savvy Tesla fanatic to the money-saving LEAF driver, everyone has a different reason for driving electric and can find the right EV for their needs. Research³ shows that most people choose to drive electric for four main reasons, exemplified by these folks:



Sally Saver

For the Savings

Charging an EV usually costs half⁴ as much⁴ as getting gas (or even less), so driving electric can **save \$13,000** over the life of an EV.⁵ Plus, EVs don't need oil changes, are less expensive to maintain than internal combustion engine (ICE) vehicles and may be eligible for tax credits and rebates.



Eco Eric

For the Environment

Driving electric cuts greenhouse gas emissions in half—or more, depending on how electricity is generated where drivers live. This reduces emissions and clears the air. Many drivers are also interested in EVs to achieve energy independence and rely on locally produced power.



Fiona Future

For the Fun Stuff

Techies want their cars to have the latest whiz-bang features, from cutting-edge software to falcon wing doors. Instant torque makes EVs fun to drive, and a quiet cabin lets drivers hear their entertainment systems like never before.



Carl Commuter

For the Time Savings

An EV means you never have to make a separate stop to refuel, saving trips to the station and time spent in line. Many states also offer high-occupancy vehicle (HOV) carpool lane access to EV drivers, which can seriously cut down on commute times.


³Center for Sustainable Energy (2016), California Air Resources Board Clean Vehicle Rebate Project, EV Consumer Survey Dashboard.

⁴ChargePoint network data.

⁵Union of Concerned Scientists.

2017 Was a Pivotal Year in EV Sales

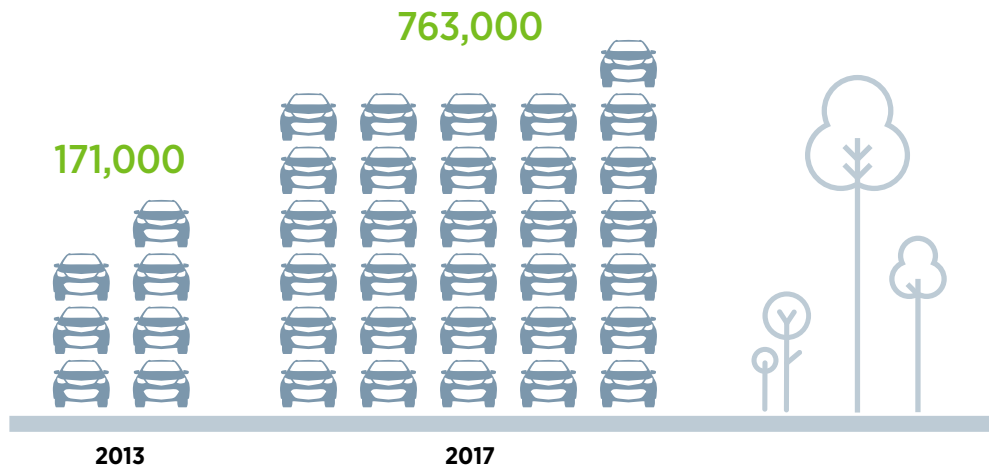
Both new EV sales and the total number of EVs on the road reflect steady, strong growth, suggesting the momentum of EV sales has reached the point of no return. The U.S. is on track to reach one million EVs on the road within the next two years. Within the next three years, estimates suggest more than 8.5 million EVs will be on the roads globally.⁶



1 million
EVs will be on U.S. roads within the next two years.

8.5 million+
EVs will be on roads globally within the next three years.

What a Difference 5 Years Make! Cumulative U.S. EV Sales⁷



What's the Difference Between PHEVs and BEVs?

Today's market is fairly evenly split between plug-in hybrid electric vehicles (PHEVs) and battery electric vehicles (BEVs). What's the difference?



Plug-in hybrid electric vehicles (PHEVs)

PHEVs have electric batteries and gas engines for backup. They can plug in or fill up.



Battery electric vehicles (BEVs)

BEVs run only on electricity. They only plug in.

Another Reason to Go Electric: EVs Cost Less to Maintain

On average, EV maintenance can cost as little as \$15 (if you don't mind doing a little DIY work) per year, vs \$766 for a new gas vehicle.⁸



⁶ Navigant Research.

⁷ Baum & Associates and InsideEVs.com data through December 2017.

⁸ AAA Reveals the True Cost of Vehicle Ownership. AAA, August 23, 2017. URL: <http://newsroom.aaa.com/tag/cost-to-own-a-vehicle/> and Chevrolet Bolt Requires Almost No Maintenance For First 150,000 Miles, InsideEVs, December 11, 2016. URL: <https://insideevs.com/chevrolet-bolt-requires-almost-no-maintenance-for-first-150000-miles/>

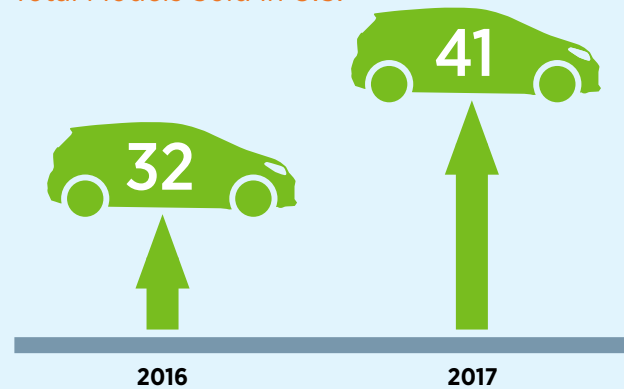
There's an EV for Everyone

There are 41 EV models that have sold in 2017 in the U.S. (vs 32 in 2016), and this number will nearly double over the next five years. We already have electric minivans, small crossovers, city cars, luxury vehicles, SUVs, buses, delivery vehicles—and pickup trucks are on the way.



28% More Model Choices Compared to 2016

Total Models Sold in U.S.



In 2017, U.S. EV sales reached nearly
200,000

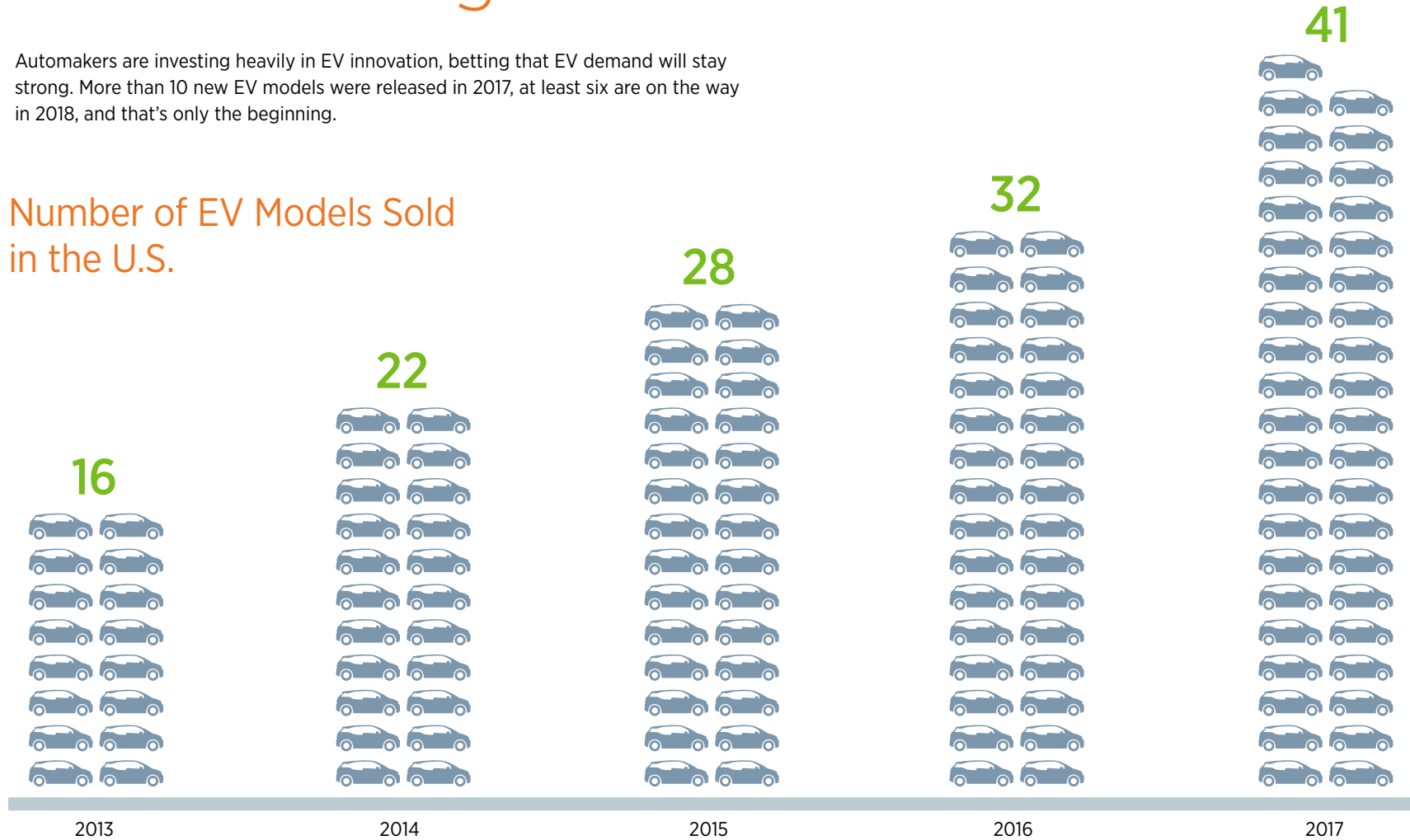


The bottom line for EV drivers? No matter what kind of vehicle you want to drive, there's an EV for you—or it's coming soon.

The Pace of EV Innovation Is Accelerating

Automakers are investing heavily in EV innovation, betting that EV demand will stay strong. More than 10 new EV models were released in 2017, at least six are on the way in 2018, and that's only the beginning.

Number of EV Models Sold in the U.S.





2018 and Beyond

The all-electric **Kia Niro** will launch in 2018.⁹

Subaru will offer a plug-in hybrid by 2018 and an all-electric model by 2021.¹⁰

Volvo will electrify all models beginning in 2019.¹¹

General Motors will offer two new EVs by 2019 and bring a total of 20 new EVs to market by 2023.¹²

Every new **Jaguar Land Rover** vehicle launched by 2020 will be electrified.¹³

Nissan-Renault-Mitsubishi Alliance will launch 12 new EVs by 2020.¹⁴

Daimler will invest \$11 billion in 10 models by 2022.¹⁵

Hyundai will have eight electric cars by 2022.¹⁶

BMW will offer 25 electrified models by 2025, 12 of which will be all-electric.¹⁷

Volkswagen Group will electrify all 300 of its cars and SUVs by 2030, delivering 80 new electrified models by 2025.¹⁸

Two-thirds of **Honda's** models will be electric by 2030.¹⁹

Ford will invest \$4.5 billion in EV development and add 13 new EVs in the next several years.¹²

Toyota and Mazda will create a joint venture to develop electric cars²⁰ and have committed \$1.6 billion to building a large-scale EV factory.²¹

⁹ Fred Lambert, "Toyota is using AI to create the next generation of electric vehicles," *electrek*, March 30, 2017.
URL: <https://electrek.co/2017/03/30/toyota-ai-next-generation-battery-electric-vehicles/>

¹⁰ James Ayre, "Subaru could offer plug-in hybrid by 2018, all-electric cars by 2021," *Clean Technica*, May 24, 2017.
URL: <https://cleantechnica.com/2017/05/24/subaru-offer-plug-hybrid-2018-electric-car-2021/>

¹¹ Adam Vaughn, "All Volvo cars to be electric or hybrid from 2019," *The Guardian*, July 5, 2017.

¹² Bill Vlasic and Neal E. Boudette, "GM and Ford Lay Out Plans to Expand Electric Models," *New York Times*, October 17, 2017.

¹³ "Every Jaguar and Land Rover Launched from 2020 Will Be Electrified," *Jaguar Land Rover*, September 7, 2017.
URL: <http://www.jaguarlandrover.com/news/2017/09/every-jaguar-and-land-rover-launched-2020-will-be-electrified>

¹⁴ Joumana Bercetche, "Renault-Nissan-Mitsubishi to launch 12 zero-emission vehicles and a robo-taxi by 2022, chief says," *CNBC*.
URL: <https://www.cnn.com/2017/09/15/renault-nissan-to-launch-12-zero-emission-vehicles-robo-taxi-by-2022.html>

¹⁵ Anne Blair, *The Future Is Electric*, Southern Alliance for Clean Energy, November 30, 2017.
URL: https://southeastdiesel.files.wordpress.com/2017/12/blair_ev_sedc_presentation.pdf

¹⁶ John Voelcker, "Hyundai-Kia: eight electric cars by 2022, dedicated EV platform," *Green Car Reports*, August 17, 2017.
URL: https://www.greencarreports.com/news/1112165_hyundai-kia-eight-electric-cars-by-2022-dedicated-ev-platform

¹⁷ Bill Howard, "BMW: We'll Have 25 Electrified Models by 2025," *Extreme Tech*, September 8, 2017.

¹⁸ Kirsten Korosec, "Volkswagen to Electrify All 300 of Its Cars and SUVs by 2030," *Fortune*, September 11, 2017.

¹⁹ John Voelcker, "Two-Thirds of 2030 Hondas Will Be Electrified Or Zero Emission: CEO," *Green Car Reports*, February 24, 2016.
URL: https://www.greencarreports.com/news/1102507_two-thirds-of-2030-hondas-will-be-electrified-or-zero-emission-ceo

²⁰ Naomi Tajitsu and Maki Shiraki, "Toyota to form electric car technology venture with Mazda," *Reuters*, September 27, 2017.
URL: <https://www.reuters.com/article/us-toyota-electric-vehicles/toyota-to-form-electric-car-technology-venture-with-mazda-idUSKCNIC3071>

²¹ Charles Riley, "Toyota and Mazda to Build \$6.1 Billion Factory in U.S.," *CNN Money*, August 4, 2017.
URL: <http://money.cnn.com/2017/08/04/news/economy/mazda-toyota-jobs-factory-trump/index.html>

New Models on Sale in U.S. in 2017²²



BMW 530e
(PHEV)



Cadillac CT6
(PHEV)



Chrysler Pacifica
(PHEV)



Honda Clarity
(BEV, PHEV)



Hyundai Ioniq
(BEV)



MINI Countryman
(PHEV)



Tesla Model 3
(BEV)



Volvo S90 T8
(PHEV)



Volvo X60 T8
(PHEV)

Reminder: What's the Difference Between PHEV and BEVs?

Plug-in hybrid electric vehicles (PHEVs)

PHEVs have electric batteries and gas engines for backup. They can plug in or fill up.

Battery electric vehicles (BEVs)

BEVs run only on electricity. They only plug in.

Coming in 2018



Audi e-tron Quattro (BEV)



Hyundai Kona (BEV)



Jaguar I-PACE (BEV)



Kia Niro (PHEV and BEV)



Mitsubishi Outlander (PHEV)



Nissan LEAF (BEV)



Range Rover (PHEV)



²² <https://www.chargepoint.com/blog/looking-back-new-ev-models-launched-2017/>

New Models Crack the Top Five

The marketplace has a strong appetite for affordable EVs. The Toyota Prius Prime and Chevy Bolt EV, both mid-priced EVs introduced in late 2016, were two of 2017's top five sellers in the U.S.

Top-Selling EV Models in 2017²³



Chevy Bolt*
(BEV)



Chevy Volt
(PHEV)



Toyota Prius Prime*
(PHEV)



Tesla Model S
(BEV)



Tesla Model X
(BEV)

*New to top 5

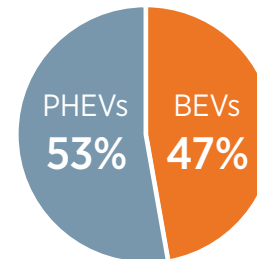
The blockbuster performance of the Toyota Prius Prime and the Chevy Bolt highlights the increasing demand for affordable EVs.

2017 Market Split²³

Top 5 PHEVs

- BMW X5
- Chevy Volt
- Ford Fusion Energi
- Ford C-MAX Energi
- Toyota Prius Prime*

Cumulative EV Sales



Top 5 BEVs

- BMW i3
- Chevy Bolt*
- Nissan LEAF
- Tesla Model S
- Tesla Model X



Key EV Market Takeaways

- + EV sales will overtake traditional car sales by 2040.
- + Longer-range all-electric models are entering the market.
- + EVs are being designed for every lifestyle and budget.
- + Automaker investment is accelerating the pace of EV innovation.

²³ Baum & Associates and InsideEVs.com data through December 2017. Select model sales are estimated.



2 EV Charging Adapts to Every Lifestyle

Convenient, Easy EV Charging

When you can access charging at home, at work and around town, everywhere you park becomes an opportunity to charge. Considering that most cars are parked more than 90% of the time,²⁴ that's a lot of chances to charge. It takes just seconds to plug in, making charging virtually effortless: your car charges while you go about your day. As more residents, employers and fleet managers install charging solutions in more places, EV charging becomes increasingly convenient.

Most cars are parked more than 90% of the time.

Home Charging Is Becoming More Common

A home charger is easy to install and its electrical requirements are similar to a washer-dryer set. When given the opportunity, people enjoy charging at home because it is convenient. Imagine leaving home with a full tank of gas every morning.

Home Charging Is Growing Fast²⁵

Average charging sessions per month as of Q4 2017:

130,000

Average charging sessions per month expected by Q2 2018:

180,000
(an increase of **38%**)



Top 5 Locations for ChargePoint Home Stations²⁵

- 1 California
- 2 Ontario, Canada
- 3 Washington
- 4 Texas
- 5 Massachusetts

A Quick Guide to EV Charging Solutions

Charging can seem complicated, but there are just a few basics you should know. There are three main charging types: Level 1, Level 2 and DC fast.

Level 1 and Level 2 charging use an on-board charger inside the car that charges the battery. Charging rates depend on what kind of outlet or charging port you are connected to, along with the size of the charger on the vehicle.

Time to Add 100 Miles of Range



Level 1:
Up to
22 hrs.

Level 2:
Up to
4 hrs.

DC Fast:
As little as
1/2 hr.

Level 1 is just plugging in to a typical 110-volt household outlet and can take 22 hours to charge an EV with 100 miles of range.

Level 2 requires a 240-volt outlet and special charging station, but can charge about six times faster than Level 1, adding 100 miles of range in about 4 hours.

DC fast stations convert AC power to DC within the station, delivering DC power directly to batteries and enabling a much faster charge. Charging rates will depend on the vehicle's state of charge, the power level of the charger and the car batteries' ability to take higher power levels. Some BEV models can get a near-full charge in less than 30 minutes.

ChargePoint offers both Level 2 and DC fast stations for public charging, as well as a Level 2 home charger.

To learn more, check out our [Quick Guide to Fast Charging](#).

²⁴ Paul Barter, "Cars are parked 95% of the time. Let's check!" *Reinventing Parking*, February 22, 2013.
URL: <http://www.reinventingparking.org/2013/02/cars-are-parked-95-of-time-lets-check.html>

²⁵ ChargePoint Home user activation data as of December 2017.

EV Drivers Charge When and Where It's Convenient

Charging happens anytime and anywhere, when EV drivers are busy doing something else. Unlike other methods of fueling, EV charging is passive, which means drivers don't have to think about it. It happens when a car is parked and drivers are working, sleeping, shopping, watching a movie or anything else.



A Day in the Life of an EV Driver

Charging Away from Home

Most Level 2 charging happens during weekdays when people are parked at the office or other locations around town. DC fast sessions are distributed more evenly throughout weekdays and weekends because drivers generally use DC fast chargers during long trips, including weekend getaways.

Level 2 Charging Peaks During Work Hours

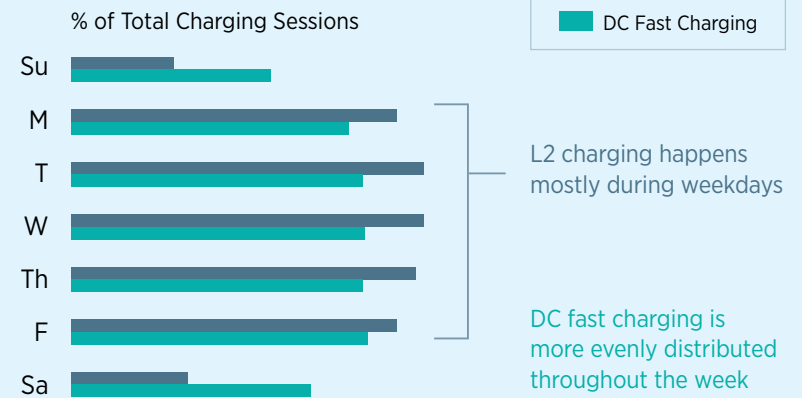
Most Level 2 stations are installed at workplaces, so it's no surprise that Level 2 sessions peak when drivers plug in at two main times: when they arrive at work and when they come back after lunch. EV charging happens on your schedule and fits effortlessly into your day.

Most DC Fast Charging Takes Place on Longer Trips

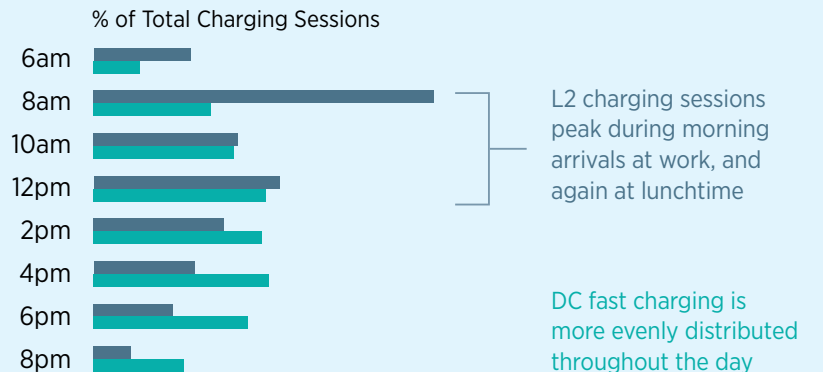
Unlike Level 2 charging, DC fast charging times are more distributed throughout the day, indicating that drivers plug in as needed on longer trips.

Charging Sessions by Day and Hour²⁶

When Drivers Charge Throughout the Week



When Drivers Charge Throughout the Day



²⁶ ChargePoint user data as of December 2017.

Charging Up Is Less Expensive Than Fueling Up

Driving an EV powered by electricity is less expensive than driving a traditional car. In many cases, workplaces and retailers offer free Level 2 charging to attract EV drivers. But even when you pay for electricity, you'll end up spending less.



Many Charging Sessions Are Free

Many ChargePoint EV charging sessions are free because employers, retailers and other businesses offer free charging to attract employees and customers.

Less Than \$3 for a Top Off

When drivers pay for charging on ChargePoint, the average session costs just \$2.60 and drivers spend approximately \$20 per month—less than a single tank of gas.²⁷

Many drivers are pleased to discover EV charging is more affordable than they expected.

²⁷ ChargePoint user data, 2017.

EV Driving Quiz

Antonio owns a traditional car that gets 24 mpg. If gas costs \$2.32/gallon and he travels 15,000 miles per year, he will spend **\$1,450 on fuel each year.**

If Antonio switches to an electric car that gets 3.1 miles/kWh, electricity costs \$0.13/kWh (the national average), and he continues to drive 15,000 miles per year, how much will he save?

Answer: Antonio will spend \$630 on electricity and save a whopping \$820 every year.



Gas car
15,000 miles=
\$1,450



Electric car
15,000 miles=
\$630

EV savings
\$820

To see for yourself how much you can save, visit our EV savings calculator at <https://www.chargepoint.com/blog/how-much-money-could-you-save-driving-electric/>

EV Charging Enables Cleaner Air

Climate change is one of the most pressing problems of our time. The widespread adoption of EV driving has the potential to dramatically reduce emissions and dependence on fossil fuels. ChargePoint drivers have already saved more than 31 million gallons of gas. Imagine how much more they will save in the coming years.



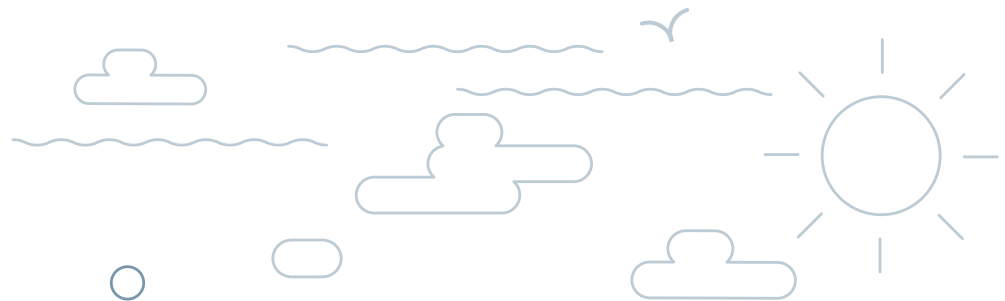
744 million
electric miles driven



More than
31 million
gallons of gas saved

Up
54%
from 2016

...which is
equivalent to...



301,419,037
fewer pounds of coal burned



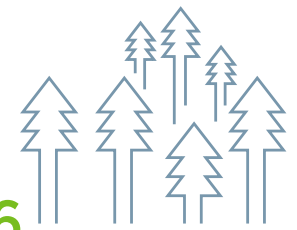
or **41,292**
fewer homes on the
electric grid



or **7,139,820**
tree seedlings grown for
10 years



or **324,496**
acres of forest grown



Key EV Charging Takeaways

- + Charging is more convenient because you do it when parked at home or work.
- + Charging is becoming more effortless as charging infrastructure expands.
- + Charging is significantly more affordable than traditional fueling.



3 The Business Case for EV Charging Infrastructure

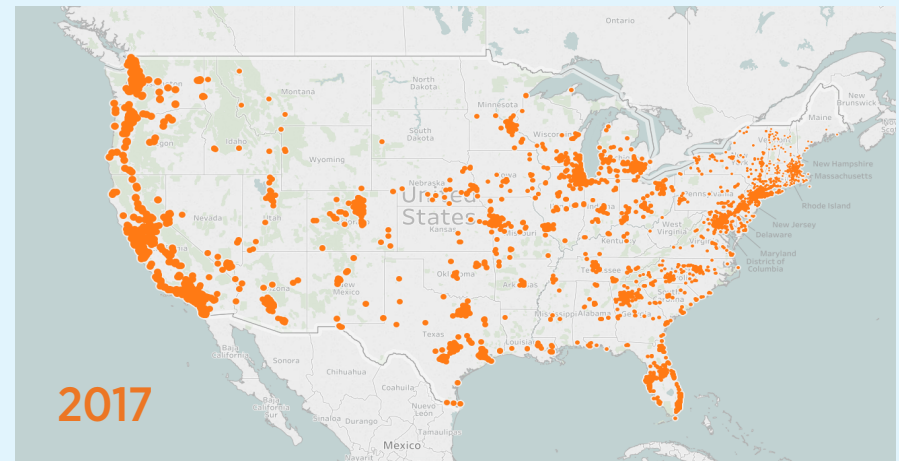
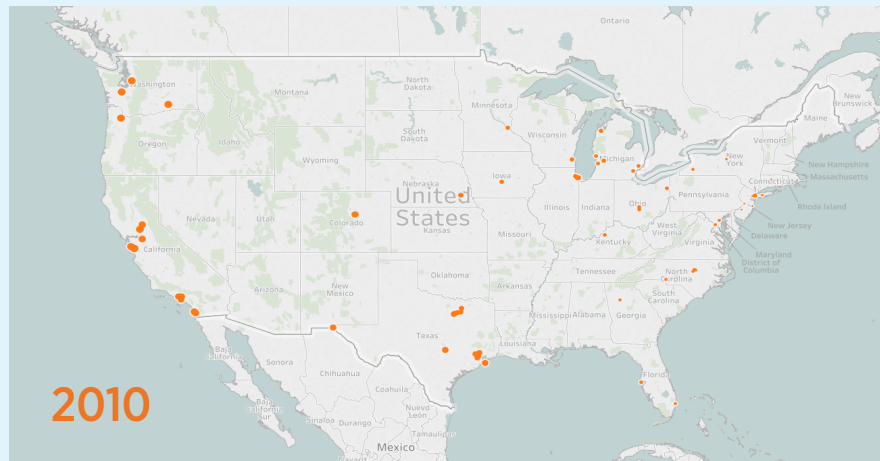
Investment in Charging Infrastructure Is Accelerating



We know EV charging infrastructure plays a critical role in the success of EV driving. But investments in EV charging infrastructure aren't just good for EV drivers and the environment, they're good for business. Workplaces, cities, fleets, utilities and other organizations are benefiting in many ways from their investments in EV charging infrastructure, from achieving sustainability goals to increasing revenues.

Many businesses and organizations are benefiting from their investments in EV charging infrastructure.








ChargePoint Charging Spots²⁸



²⁸ ChargePoint user data, December 2017.

The Benefits of Investing in EV Charging Infrastructure

Depending on your industry, investments in EV charging can deliver a wide variety of benefits.

Business Type	Why Choose EV Charging?	Did You Know?	
Apartments 	<ul style="list-style-type: none"> + Attract and retain high value, green-minded residents + Increase average rent and property value 	<ul style="list-style-type: none"> + Meet emerging state and city regulations + Improve your green standing and meet sustainability goals, eg, LEED certification 	Some states and cities require new buildings to support EV-ready construction for 3%–25% of parking spots.
Cities and Towns 	<ul style="list-style-type: none"> + Drive more traffic to local businesses + Boost downtown economy 	<ul style="list-style-type: none"> + Create new jobs + Meet emerging government regulations 	Cities like Pittsburgh and San Francisco are testbeds for autonomous vehicles because they have crafted favorable policies. ²⁹
Condos 	<ul style="list-style-type: none"> + Support condo owners' requests for EV charging + Enable condo owners to add a desirable property upgrade without burdening other community members 	<ul style="list-style-type: none"> + Make your property attractive to future home buyers + Comply with emerging HOA laws and building standards 	At least 5%–10% of residents at a multi-family property will purchase plug-in electric vehicles over the next three to five years. For new construction in high-EV-density locations, 10%–20% of residents will drive EVs.
Fleets 	<ul style="list-style-type: none"> + Meet government mandates and regulations + Reduce operating expenses with lower fueling and maintenance costs 	<ul style="list-style-type: none"> + Achieve sustainability goals + Proactively manage expenses 	With a networked EV solution, you can save 60% in capital expenses.
Retail 	<ul style="list-style-type: none"> + Attract new and repeat customers + Increase shopping time 	<ul style="list-style-type: none"> + Boost customer satisfaction + Achieve sustainability goals 	Adding your charging station to the ChargePoint network makes it visible to 70% of EV drivers—it's like free advertising for your store.
Utilities 	<ul style="list-style-type: none"> + Sell more electricity as transportation fuel + Create grid benefits + Electrify utility fleet vehicles 	<ul style="list-style-type: none"> + Increase customer satisfaction + Support sustainability goals 	There are now more than 55 active utility-sponsored EV-incentive programs in the U.S.
Workplace 	<ul style="list-style-type: none"> + Attract and retain top talent + Increase employee satisfaction 	<ul style="list-style-type: none"> + Improve productivity + Achieve sustainability goals 	One in four of Fortune "100 Best Companies to Work For" is a ChargePoint customer.

²⁹ The Future of Urban Mobility in Smart Cities, ChargePoint.

Commercial Charging Infrastructure Expands Across Industries

Numerous industries are adding charging solutions in response to current or forecast demand. The overall rate of growth is 41%, which shows charging infrastructure is still in a rapid growth phase. Parking, multi-family, and federal and state government are the industries with the highest rates of growth.³⁰



The overall rate of charging infrastructure growth is **41%**.

EV Driving and Charging: The Yin and the Yang

Investments in EV Charging Support EV Growth, and Vice Versa

Industries with the highest rate of growth:

Parking
64%



Multi-Family
55%



Government
51%



More EV Charging

As more places offer EV charging, more drivers switch to EVs.



As more drivers choose electric, more businesses install charging to attract them.

More EVs

³⁰ ChargePoint network data.

Financial Incentives Spur Demand for Charging Infrastructure

EV-friendly government policies encourage EV ownership in many states, including California, Washington, Texas and others. In many of these states, new EV purchases and registrations are growing faster than new infrastructure development. Businesses that choose to meet this demand with investments in charging infrastructure can benefit from first mover advantage.

Top 10 States for EV Driver Growth³¹

New Charging Solutions Help Power New EV Drivers

- 1 Utah
- 2 Oklahoma
- 3 Vermont
- 4 Colorado
- 5 Idaho
- 6 Nevada
- 7 New Hampshire
- 8 Missouri
- 9 Arizona
- 10 Massachusetts



³¹ Of states with a minimum of 1,000 registered EVs. Source: Compiled by ChargePoint with data provided by IHS Markit through Q3 2017.

³² Ami Joi O'Donoghue, "Utah's I-15 part of national's alternative fuels, electric charging corridor," *Deseret News*, November 3, 2016. URL: <https://www.deseretnews.com/article/865666381/Utahs-I-15-part-of-national-alternative-fuels-electric-charging-corridor.html>

³³ Adam Wilmoth, "Rapid charging station books electric vehicles near Yukon," *The Oklahoman*, December 29, 2016. URL: <http://newsok.com/article/5532558>

³⁴ Home Charging Incentive Pilot Program—Blaine County. URL: <https://docs.idahopower.com/pdfs/aboutus/sustainability/stewardship/EV%20Home%20Charging%20Incentive-Blaine%20County%20Pilot%20Terms%20and%20Conditions.pdf>

Utah, Oklahoma and Idaho Add Charging Stations, Then Drivers

The planned installation of new charging solutions can encourage drivers to buy or lease EVs, especially in states where EV infrastructure is relatively new. Examples include:



Utah's EV charging corridor

The 402-mile I-15 corridor through Utah is one of 55 routes in 35 states that will serve as the foundation for the nation's electric charging network. Portions of I-80 from Salt Lake City to Park City and from Salt Lake City to Nevada are also part of the 85,000 miles of roadways that will include signage identifying exits where charging stations are available.³²



Oklahoma Gas and Electric and OnCue's planned investment in charging infrastructure

Oklahoma Gas and Electric and OnCue, a roadside fueling station brand, are planning to expand charging infrastructure throughout the state. Already, they have installed a fast-charging station in the Yukon area, prompting local residents to buy or lease EVs. In addition, Oklahoma recently designated interstates 35, 40 and 44 as EV charging corridors.³³

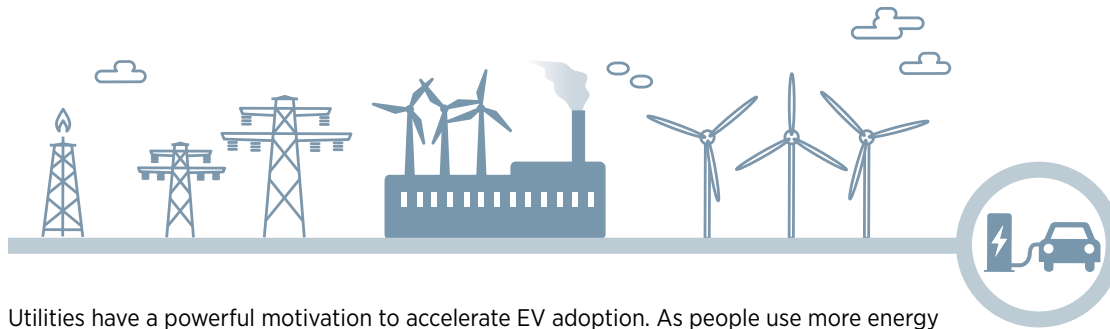


Idaho Power encourages charging at home

For more than six months in 2017, Idaho Power offered financial incentives to their customers in Blaine County who installed a charging station at home.³⁴



Utilities Help Accelerate the Development of Public Charging Infrastructure



Utilities have a powerful motivation to accelerate EV adoption. As people use more energy efficiently, smart charging electric vehicles provide an important opportunity for the utility. Well-designed charging infrastructure programs that are sponsored by utilities are likely to further accelerate EV growth. As utilities help roll out more places to charge, EV driving will become more accessible to even more people.

Some utility-sponsored charging infrastructure programs include:³⁵

San Diego Gas & Electric incentivizes

3,500 ports

through *Power Your Drive* program

Southern California Edison incentivizes

1,500 ports

through *Charge Ready* program

Pacific Gas & Electric incentivizes

7,500 ports

through *EV Charge Network* program

How Rocky Mountain Power Is Plugging Utah In



Rocky Mountain Power (RMP) has an EV program that provides rebates to its customers to purchase and install charging infrastructure to help accelerate the deployment of charging infrastructure and EV adoption in Utah. Utah is now in the top three EV growth states thanks to the RMP rebate program, new availability of EVs in the Utah market and the awareness of the benefits of driving electric.

Learn more here:

<https://www.rockymountainpower.net/env/ev/tcb.html>



³⁵ Jeff St. John, "California Utilities Seek \$1 Billion to Build Out Electric Infrastructure," Greentech Media, January 24, 2017. URL: <https://www.greentechmedia.com/articles/read/california-utilities-seek-1b-to-build-out-electric-vehicle-infrastructure>

Smart Networks Make Charging Work for Any Business



EV charging stations are of limited use if they are siloed into multiple proprietary networks or prohibitively difficult for owner-operators to manage. Unless stations are connected to an intelligent charging network, station owners cannot easily set fees for charging, control who uses their stations or track usage data. Smart EV charging solutions deliver a greater return on investment in charging with:

- + Tools for setting the price that drivers pay to charge based on energy, time, session or driver group, plus the flexibility to change this price over time
- + Ability to manage who can access at a station and when
- + Power management software to install more charging spots while controlling energy costs
- + Integration with mobile apps and in-dash vehicle systems that drivers use to find, access and pay for charging
- + A graphical dashboard that shows real-time status and a detailed map, making it easy to check on stations from your desk or mobile phone

³⁶ As of December 2017.

ChargePoint: the World's Leading EV Charging Network



Total commercial charging spots:
43,000³⁶



Charges delivered:
31 million³⁶



Key Takeaways for Businesses

- + Charging infrastructure presents a market opportunity for all businesses.
- + Businesses are adding commercial charging solutions at a rapid clip.
- + New charging infrastructure spurs EV driver growth and vice versa.



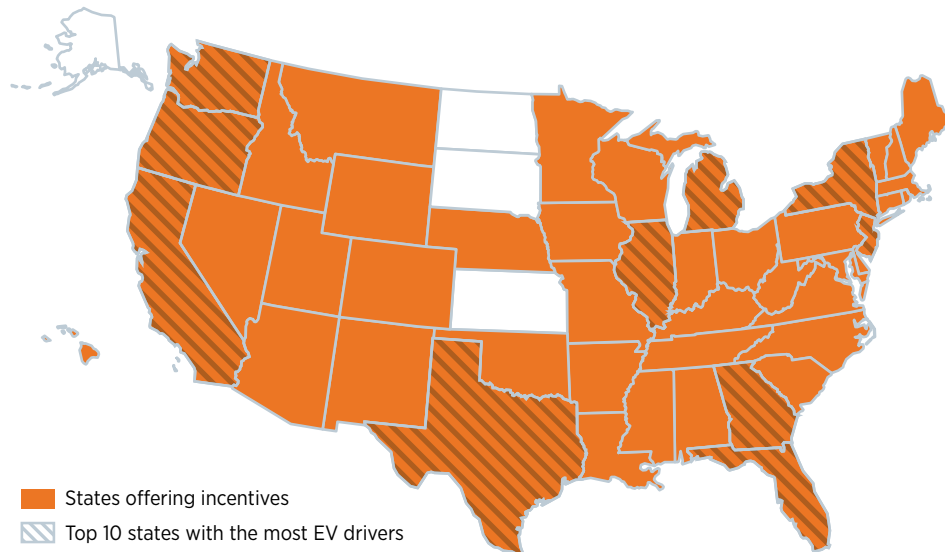
4 Expanding Incentives for EV Drivers

State Governments Lead the Way

As of the end of 2017, **46 states offer incentives for EV drivers and/or businesses that operate fleets or EV infrastructure.**³⁷ While uncertainty surrounds the federal government's EV incentives, state and local governments continue to provide financial support for EV adoption and charging infrastructure. These incentives are driving EV growth throughout the U.S.

Financial Incentives Are Working

State policies promoting investments in EV and charging infrastructure are accelerating EV driver growth. Most of the top 10 states with the most EV drivers have offered attractive financial incentives for the past few years or more.



³⁷ National Council of State Legislatures.

Did You Know?

EV Tax Incentives Come to the South and the Rocky Mountains

Financial incentives for EV ownership aren't limited to the West and East Coasts. A growing number of states throughout the country are offering tax credits to EV buyers. Some of the most generous are:

Colorado



A tax credit of up to \$5,000 when you buy at a local dealership

Louisiana



An alternative fuel vehicle (AFV) tax credit that can be applied to 7.2% of your vehicle purchase cost, not to exceed \$1,500

Texas



A tax credit of up to \$2,500 when you buy at a local dealership

Check out what grants, rebates and tax credits are available in your region:

chargepoint.com/products/station-incentives/

Financial Incentives in the Top States for EV Drivers

The top states for total EV drivers are using financial incentives to promote EVs and charging infrastructure.

State	EV Drivers	Commercial Charging Stations
California	\$2,500 rebate (based on income eligibility)	+ Periodic state-level grants for qualifying businesses + Numerous local and utility-sponsored programs
Washington	Sales tax exemption	Sales tax exemption
Florida	+ New EV rebates from Jacksonville Energy Authority and Gulf Power + HOV lane access	+ A rebate worth up to half the cost of buying and installing a charging station in Sarasota County + \$200 rebate (Orlando Utilities Commission)
Texas	\$2,500 rebate available through dealerships (Tesla excluded)	+ Up to \$600K for charging stations (Alternative Fueling Facilities Program) + A rebate of up to \$4,000 or 50% of the cost to buy and install approved Level 2 charging stations (Austin Energy)
New York	\$2,000 rebate	+ Rebates for municipalities that purchase or lease electric fleets (State of New York Charge NY Program) + Workplace charger rebates (PSEG Long Island)
Georgia	HOV lane access with a permit	\$500 rebate for business charging stations (Georgia Power)
Illinois	NA	Alternative Fuel Vehicle Fleet Incentives
New Jersey	+ Sales tax exemption + HOV lane access	Grants of up to \$5,000 per Level 2 charging station (EV Workplace Charging Grant)



Key Incentive Takeaways

- + State financial incentives promote EV driving and infrastructure.
- + State incentives support EV driver growth.



5 EVs Drive Advances in Renewable Power and Power Distribution

Utilities Play a Crucial Role

The rapid transition from petroleum-based mobility to a transportation system that runs on electricity is the biggest transformational opportunity for utilities ever. EV drivers represent beneficial electric load growth for the utility and a chance for them to grow sustainably by:

- + Investing in renewable power
- + Providing power management tools to help fleets and individuals use more power efficiently
- + Designing new technologies to separate and balance EV loads
- + Incentivizing the installation of smart connected charging infrastructure and helping to raise awareness of the benefits of electricity as a transportation fuel.

For the coming EV generation, the role that utilities will play in shaping our transportation experience will be much like that of gas providers over the past 100 years.

The role that utilities will play in shaping our EV transportation experience will be much like that of gas providers over the past 100 years.

EVs Are Increasing Demand for Electricity³⁸

Currently, ChargePoint solutions dispense 8 gigawatt hours (GWh) of energy per month, but that figure will likely reach 12 GWh/month over the next year. Our projections suggest that this trend will accelerate as the EV market expands throughout the country.

Energy Dispensed Each Month by ChargePoint Solutions

Current rate:
8 GWh

Projected rate over the next year:

12 GWh



³⁸ ChargePoint user data, December 2017.

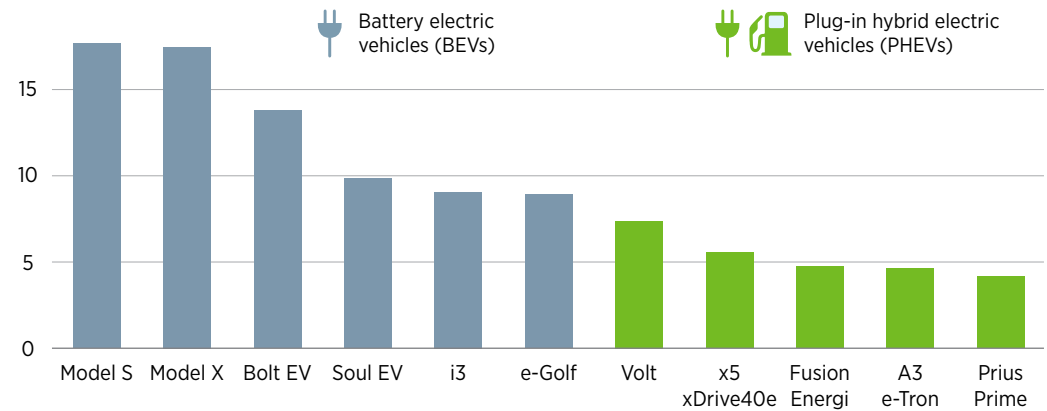
The Rise of the Smart Grid

The rapid growth of EVs—as well as larger batteries and faster charging, supporting longer-range driving—will increase the load on the existing electrical grid. Utilities and electrical engineers specializing in the EV charging industry have already identified this challenge. They are developing new “smart grid” technologies for separating and routing EV charging requests, better balancing the load across the distribution grid to avoid compromising charging time and EV driver experience. A long-term goal, to support “vehicle-to-grid” (V2G) solutions in which plug-in electric vehicles can communicate with the grid, will enable drivers to sell electricity or modulate how quickly they charge.

The growth of EVs has accelerated the pace of smart grid research related to transportation electrification, which will likely produce a more intelligent, resilient and modern grid to benefit all electricity users.

V2G solutions will enable plug-in electric vehicles to communicate with the grid—enabling drivers to sell electricity or modulate how quickly they charge.

Power (kWh) per Charging Session, by Model³⁹



As batteries get larger, the smart grid and V2G technologies will manage bigger charging loads

³⁹ ChargePoint user data, December 2017.

California Leads the Way

California has pioneered the widespread introduction of EV driving and the transformation of gas-powered transportation into electric mobility (e-mobility). This transformation has led to higher electricity usage, which the state is addressing through ambitious goals and innovation:

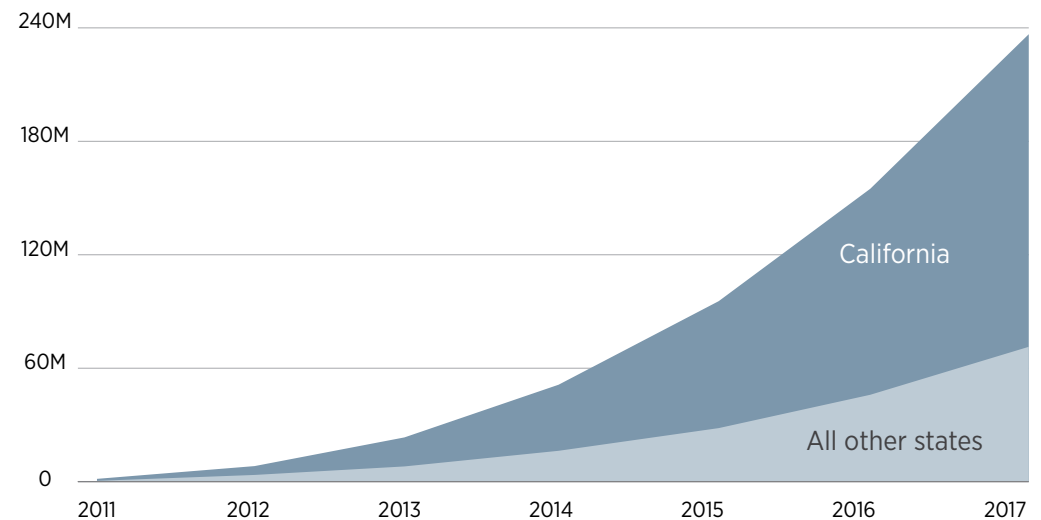
- + California lawmakers are proposing a deadline of 2045 for phasing out non-renewable power⁴⁰
- + Utilities such as Southern California Edison and PG&E are designing new smart grid technologies and modernizing the state's power grid⁴¹
- + Researchers are looking into ways EVs can deliver energy to the electric grid, possibly providing a new revenue model for EV owners

While other states may not adopt the same policies, California shows that EV growth is highly manageable and tends to foster innovation.

California shows that EV growth is highly manageable and tends to foster innovation.

Total Energy by State

California Provides 70% of the Electricity Consumed by EVs⁴²



Key Energy Takeaways

- + The growth of EV driving will increase demand for electricity.
- + Much of the new demand for electricity will be met through increased investment in renewable power sources.
- + Smart grid and V2G technologies will manage increased loads and provide more flexible and reliable power distribution for all electricity consumers.
- + California's experience suggests the rise of EV driving will foster increased use of renewable power and rapid technological innovation.

⁴⁰ Trevor Nace, "California Goes All In—100% Renewable Energy By 2045," *Forbes*, August 1, 2017.
URL: <https://www.forbes.com/sites/trevornace/2017/08/01/california-goes-all-in-100-percent-renewable-energy-by-2045/#13b12dde570f>

⁴¹ "Grid Modernization at Southern California Edison," Edison International.
URL: <https://www.edison.com/home/innovation/grid-modernization-at-southern-california-edison.html>

⁴² ChargePoint data, December 2017.



6 The Future Is Electric

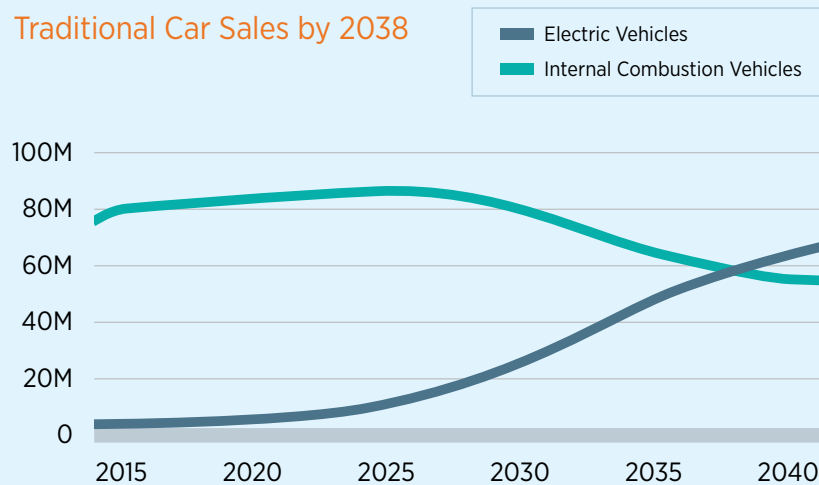
The Next Era of e-Mobility

Just as the nineteenth century belonged to the steam engine and the twentieth to the internal combustion engine, so future generations will look back and see that mobility in the twenty-first century belonged to electrically powered vehicles. Bloomberg predicts that by 2040, 54% of new car sales worldwide will be electric, and the majority of vehicles on the road globally could be EVs shortly thereafter.⁴³

By 2040, 54% of new car sales worldwide will be electric.

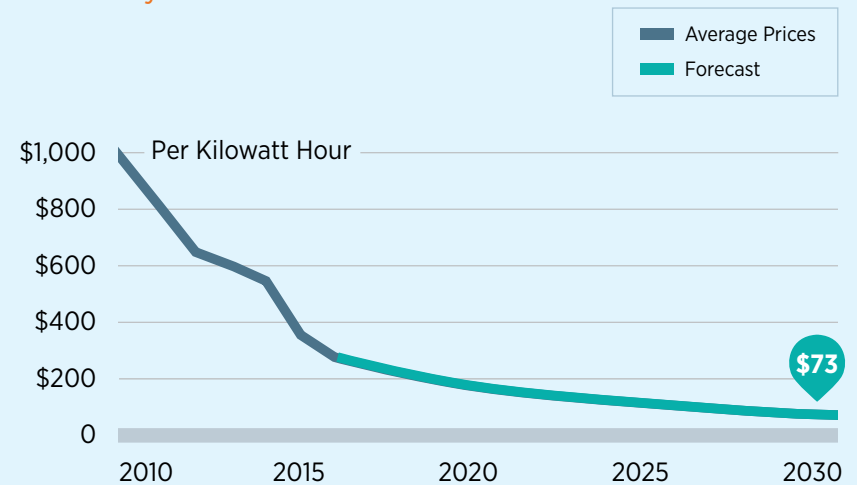
Number of Vehicle Sales⁴³

EV Sales Will Overtake Traditional Car Sales by 2038



Battery Costs⁴³

EV Battery Prices Will Continue to Fall



⁴³ Bloomberg New Energy Finance.

Five Predictions Over Five Years

We looked into our crystal ball to see the future of e-mobility. Here are our five predictions for the next five years.



Prediction

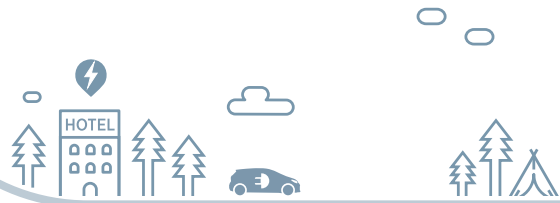


Electrification Becomes Truly Global

Automakers and governments worldwide will strengthen their commitments to electrification, bringing out new models and introducing policies to phase out polluting vehicles and encourage broader EV adoption.

We predict that at least five additional countries will set target dates for full electrification within the next five years.





Prediction



An Expanding Fueling Network and More Car Models Make Electric Driving Ubiquitous

Our streets will get ready to accommodate greater numbers of personal and fleet EVs with new charging spots that make it even easier to plug in everywhere, including convenient fast charging hubs for longer trips.

We predict that more than 3 million commercial charging spots will be installed globally by 2020.

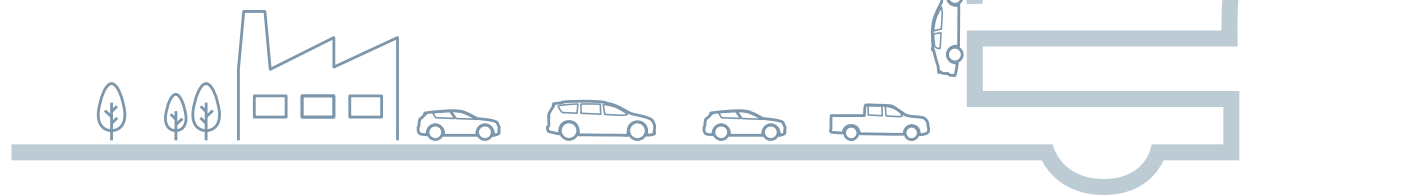
Prediction

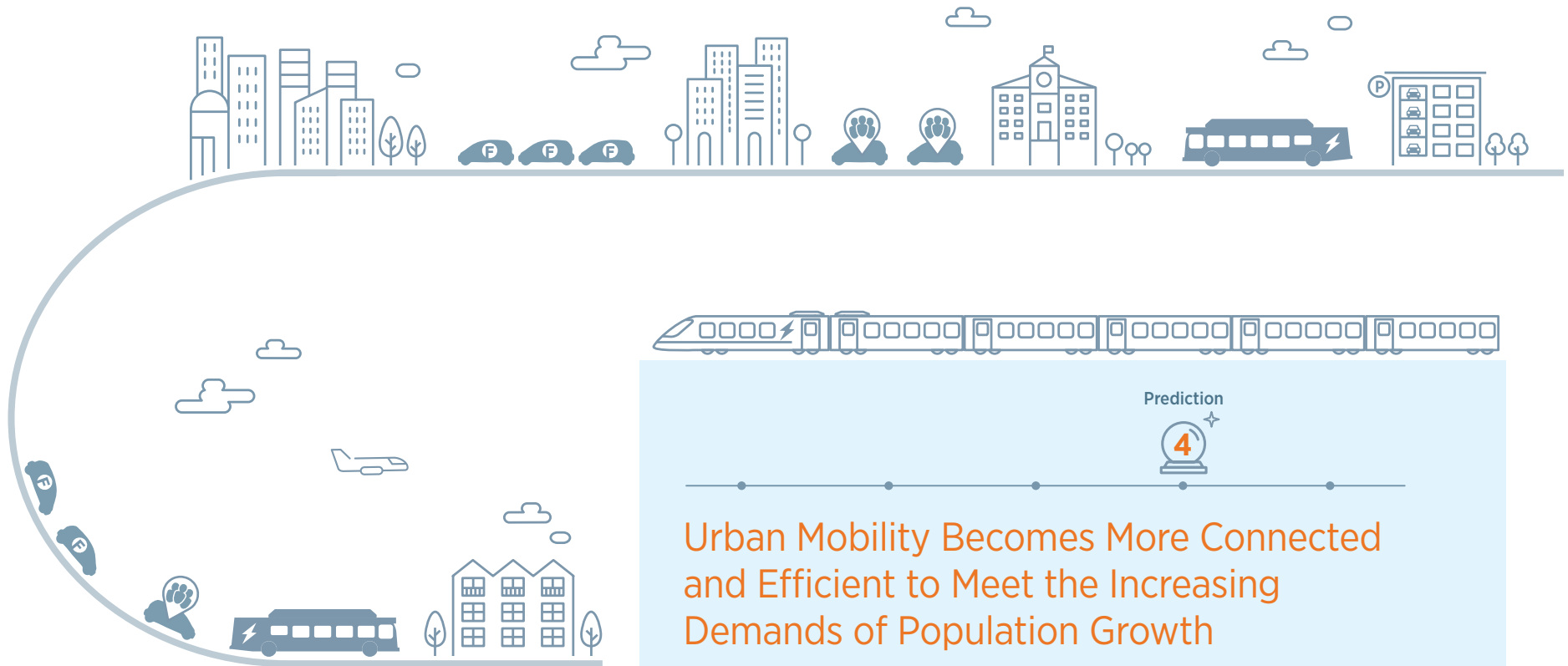


Automakers Toss the Status Quo for New Business Models

As automakers embrace e-mobility, they will look beyond the concept of units shipped and start defining success by vehicle miles traveled (VMT). Consumers, who'll be able to choose to own, lease, rent, or share an EV, will benefit from greater choice and flexibility.

We predict that automakers will offer a vehicle-as-a-service model, earning revenue on a cost-per-mile basis and ultimately earning more money per vehicle.





Prediction

4

Urban Mobility Becomes More Connected and Efficient to Meet the Increasing Demands of Population Growth

As more people move into urban environments, ridesharing and other forms of on-demand mobility will become a necessity. Cities will plan for fleets of connected EVs to begin replacing individual cars to reduce congestion and pollution.

We predict that new, innovative city and town designs will embrace e-mobility to meet existing air quality targets and decrease congestion while improving local living standards and economic prospects.

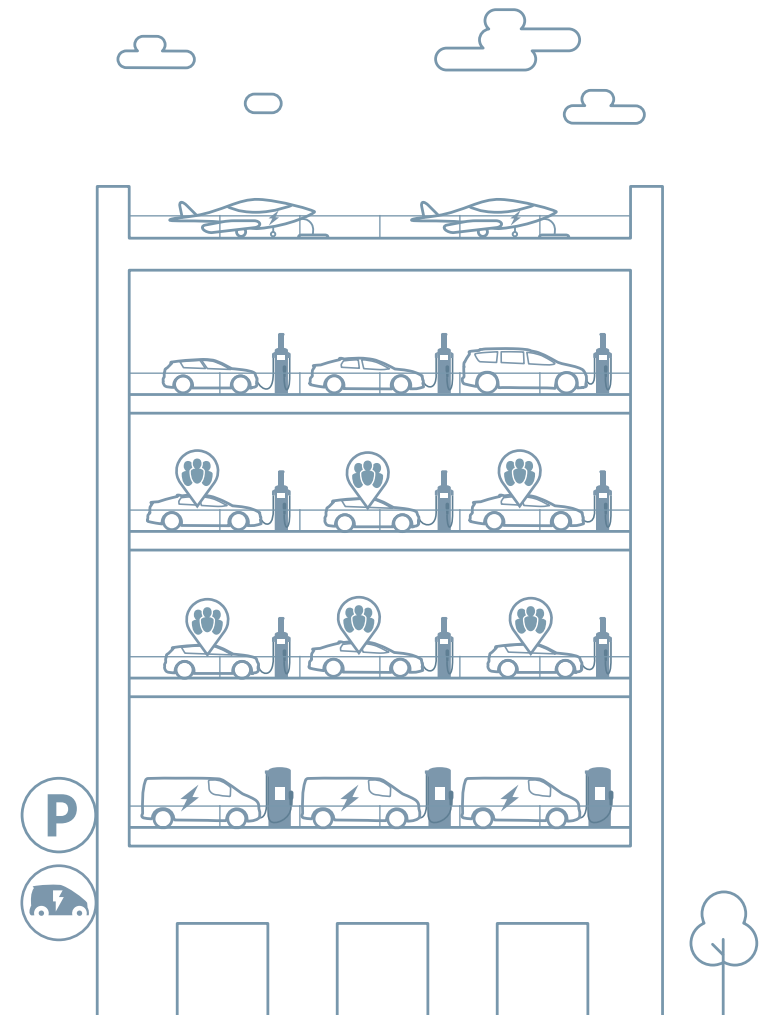
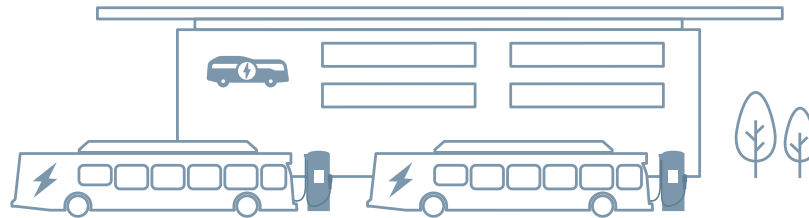
Prediction



Fleetification: Fleets Disrupt the Entire Transportation Ecosystem—from Commuter Vehicles to Bus Depots and Beyond

As urban delivery fleets grow, shared ride offerings will increase. As technology (eg, mobile apps, autonomous vehicles) drives a reduction in individual vehicle ownership, more fleets will appear.

We predict that innovations in charging, the proliferation of autonomous vehicles, the deployment of smart technology and the increased ability to monitor and manage all types of electric-powered fleets will completely disrupt traditional transportation models.



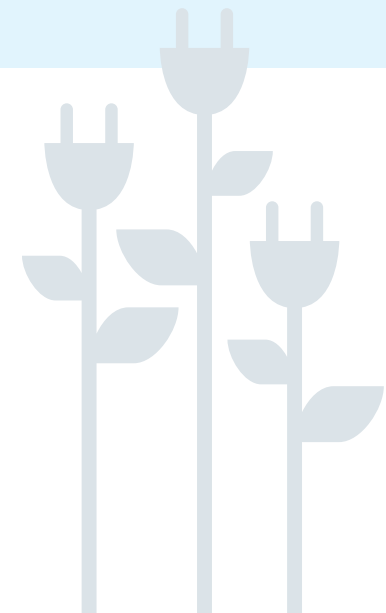


Five Predictions Over Five Years

The Journey to e-Mobility

- 1 Electrification becomes truly global.
- 2 An expanding fueling network and more car models will make electric driving ubiquitous.
- 3 Automakers toss the status quo for new business models.
- 4 Urban mobility becomes more connected and efficient to meet the increasing demands of population growth.
- 5 Fleets will disrupt the entire transportation ecosystem—from commuter vehicles to bus depots and beyond.

We believe the next five years will be a transformative time for electric transportation. The transition to e-mobility will affect how we live, work and grow our businesses and communities. Buckle up, because change is happening fast!





For More Information

Find Out More

If you have questions about any of this data or want to learn more about charging, please contact us:

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Thank You

A sincere thank you to all of our EV drivers, customers and ecosystem partners. The EV revolution couldn't happen without you. We're proud to be working together to build the future of transportation.

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