

ELECTRIC VEHICLE CHARGING INFRASTRUCTURE – WHERE DO YOU PLUG IN?

Jules Smith

One of the biggest challenges facing the wider adoption of electric vehicles is the charging infrastructure. Where do you plug in? With limited battery range and charge times of a half hour or more for even the most powerful chargers, it's crucial that charging facilities be plentiful and readily accessible. Where does the electric vehicle charging infrastructure stand now and where is it headed?



Sun Country Highway is on a mission to build the most sustainable electric vehicle infrastructure in the world.

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You probably don't remember the 1880's, when those newfangled automobiles started appearing on public roads. At first there weren't many of them, partly because – unlike horses that could graze on any nearby grass or hay – automobiles ran on gasoline, and there were few gasoline service stations around. Why would there be? There were so few automobiles to service.

Eventually, that Catch-22 worked itself out. Today, there are gas stations on almost every corner, serving the millions of cars and trucks that clog our streets and highways and that pollute our air. Those stations are easy to spot, often sitting beneath large, bright signs bearing the familiar logos of major fuel companies.

Electric vehicles are, in some respects, in the same position gas-powered vehicles were in more than a hundred years ago ... minus the pollution. There were just over 2 million electric vehicles sold in 2018, according to [Inside EVs](#), compared to more than 80 million vehicles total. You can understand why the charging infrastructure is so much less developed than the traditional fuel infrastructure.

But the numbers are changing. Scott Shepard, research analyst with [Navigant Research](#), notes “The U.S. market for plug-in electric vehicles is reaching a new level of maturity and expansion. The introduction of PEV options in the truck, van, and sport utility vehicle segments – which make up half the North American automotive market – will help drive strong growth in the PEV market going forward.” Navigant forecasts sales to increase at an annual growth rate of 23.7 percent through 2023. Nevertheless, there remains the issue of infrastructure. If you drive an electric vehicle, where do you charge it?

HOME CHARGING

Flatulence jokes aside, few of us have a gas station in our home. If you need fuel, you have to go somewhere else to get it. On the other hand, it's more than likely that if you own an electric car you also own a charger. Your dealer probably sold you one, or your car may have come with a built-in charger that you can plug into any standard outlet. The Chevy Volt, for example, comes with a portable charge cord that connects to a standard North American 120 volt outlet to fully charge the car in about 12 hours.

Since many utility companies offer off-peak rates, it's likely you'll want to plug your car in at night so it's ready to go with a full charge in the morning. No stop at a gas station required.

Electric Vehicle Charging Levels

In this article, we've mentioned charging 'Levels' a few times. For the sake of simplicity, assume that fully charging your electric car will take 10 to 16 hours with an AC Level 1 charger; 3 to 4 hours with an AC Level 2 charger; and about a half hour with a Level 3 charger, also referred to as a DC Fast Charger. In reality, those times will depend on the type of vehicle, the ambient temperature, and the condition of the batteries.

Keep in mind, however, that these “Levels” are the American standard for charging. There are different standards in Europe, in Asia, and in individual countries around the world. There are also different standards for the physical configuration of the charging sockets and for the electronic communication between the vehicle and the charger. This slurry of standards is driven by the whims of governments and manufacturers, all of whom have their own agendas.

The good news is that unless you're planning to ship your electric car overseas, you probably don't need to worry about it. Eventually, the world will reach some kind of consensus. Maybe. In the meantime, just be sure to follow your vehicle's manufacturer's instructions.

WORKPLACE CHARGING

Increasing numbers of employers are also offering charging facilities for their employees. Besides being a valuable perk that helps to attract and retain skilled workers, it demonstrates corporate and sustainability leadership. Search giant Google, for instance, built its first electric vehicle carport for employees in 2007, powered by solar photovoltaic panels. Since then it's created the largest corporate EV charging infrastructure in the U.S., with more than 300 stations across the country.

It's not just high-tech companies whose management understands the benefits of providing charging facilities for worker's electric vehicles.

In 2013, the U.S. Department of Energy launched the Workplace Charging Challenge, encouraging companies to provide charging facilities for all their employees driving electric vehicles. That effort resulted in the addition of thousands of additional charging locations across the country. Many of the companies that participated in the Challenge are involved in some aspect of the energy or automotive industry, but not all. The list includes insurance firms, food and beverage manufacturers, and online training companies.

PUBLIC CHARGING

"If you build it ..." may work for baseball fields, but serious investors need more assurance than that before committing their money to building a national infrastructure for electric vehicles that may or may not soon become mainstream. One company willing to make such a commitment is [Sun Country Highway](#). Their mission is "to build the most sustainable electric vehicle infrastructure in the world." So far they've made remarkable progress, starting in Canada and now spreading into the United States and Europe. They now have more than 4,000 charging stations installed across North America.

The host – be it a hotel, a restaurant, or a bowling alley – provides both the location and the electricity free. In return, it enjoys increased traffic and exposure. The chargers attract customers who may otherwise have gone elsewhere, and who are more likely to do business with the host while they wait for their car to charge. Sun Country Highway benefits from increased exposure as well. They sell the initial charger to the hosting sponsor and, since more charging locations mean more people are likely to buy electric cars and chargers of their own, they will eventually enjoy additional sales directly to consumers.

Even traditional fuel companies are getting involved. Canada's Petro-Canada, for example, is rolling out a network of more than 50 fast-charging stations across the country. Expect to see other gas stations following suit, taking advantage of the real-estate they already have.

RANGE ANXIETY

Despite the widespread availability of places to charge an electric vehicle, many potential drivers are scared off by range anxiety. What if they're out, their batteries run low, and there's no place to plug in? In practice, it's not likely to happen.

Stephen Bieda with Precept Benchmark Consulting and Sun Country Highway explains, "80 to 90 percent of charging is done at home and work places. In real terms people think they need charging in public places but quite often they don't because your electric vehicle, when you leave home or work, is already fully charged."

Once you're out of the driveway, where do you go and how far? According to studies by the U.S. Department of Energy's Vehicle Technologies Program, most trips are for commuting to and from work, shopping, and visits with family and friends. And most of those trips are less than 10 miles in length. In practice, most of us drive fewer than 33 miles or 53 kilometers in a day. That's well within the range of a fully charged electric car. The 2019 Nissan Leaf, for example, has a full charge range of 150 miles or 241 kilometers, more than enough to accommodate the average driver.

Just as the fuel gauge in a car with a gasoline or diesel engine will warn you when your tank is nearing empty, so electric vehicles include a meter that warns you when the vehicle's batteries are getting low. But they're often much more sophisticated than a simple fuel gauge. They may also tell you how far you can travel on the remaining charge, allow you to adjust the vehicle's performance to maximize range, and may even give you directions to the nearest charging station.

But what if, despite all this technology, you still find yourself on the side of the road with a flat battery?



AAA is equipping its Roadside Assistance vehicles with electric vehicle chargers designed to get you to the next station.

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Some electric cars, like the Chevy Volt, have a backup gas-powered generator that switches on if the battery gets too low, effectively giving you the same range as any other traditional fuel vehicle.

For purely electric cars, there are mobile charging services, basically generators on wheels. The AAA (American Automobile Association) now offers roadside assistance to EV owners with Level 2 and 3 chargers that can, depending on the vehicle, deliver enough of a charge in 10 to 15 minutes to allow the car to go up to 15 miles, usually sufficient for the driver to find some other place to plug in. Similar services are available from automobile associations and private towing companies in Canada, Japan, the UK, and across Europe ... anywhere electric car owners may need a quick emergency boost.

All of this should put to rest any fears that you won't be able to get to where you need to be in an electric vehicle. Stephen Bieda notes, "When you have the distributed energy model start to take root and people start to understand this new way of thinking about getting from point A to point B, it helps allay these anxieties."

YOUR EV CHARGING INFRASTRUCTURE IS READY

In a sense, we already have a vast infrastructure in place for charging electric vehicles. With a mobile or built-in charger, you can plug in your car anywhere there's a standard power outlet. You just need to make an equitable arrangement with the owner of the source.

If you want a faster charge, look around. Thanks to intrepid investors, public awareness campaigns, and smartphone apps, it's getting easier to find the thousands of charge stations already online.

Once we know that finding a place to plug in is as easy as finding a place to fill up, we'll be that much closer to relegating gas and diesel vehicles to the same museum where we house the horse and buggy.

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