



# Electric Vehicle Charging Stations & Digital Signage

## Charging More than Just Vehicles

By: Todd Mares

Electric vehicles (EVs) have been around for more than 100 years, with the first “small-scale electric cars” invented in 1828. It wasn’t until the 1890s that the first successful EV was created, which sparked an interest in both consumers and automakers.<sup>1</sup>

Historically, EVs were not widely adopted by consumers due to their short driving time and long charging sessions compared to conventional gasoline or diesel cars. However, today that is no longer the case with battery charging time being of little concern for a plug-in electric vehicle (PEV) owner.

With the rise in pollution, gas prices, conventional car list prices, and the overall slump in the economy, the demand for PEVs is growing rapidly and with that demand also comes the need for charging stations.

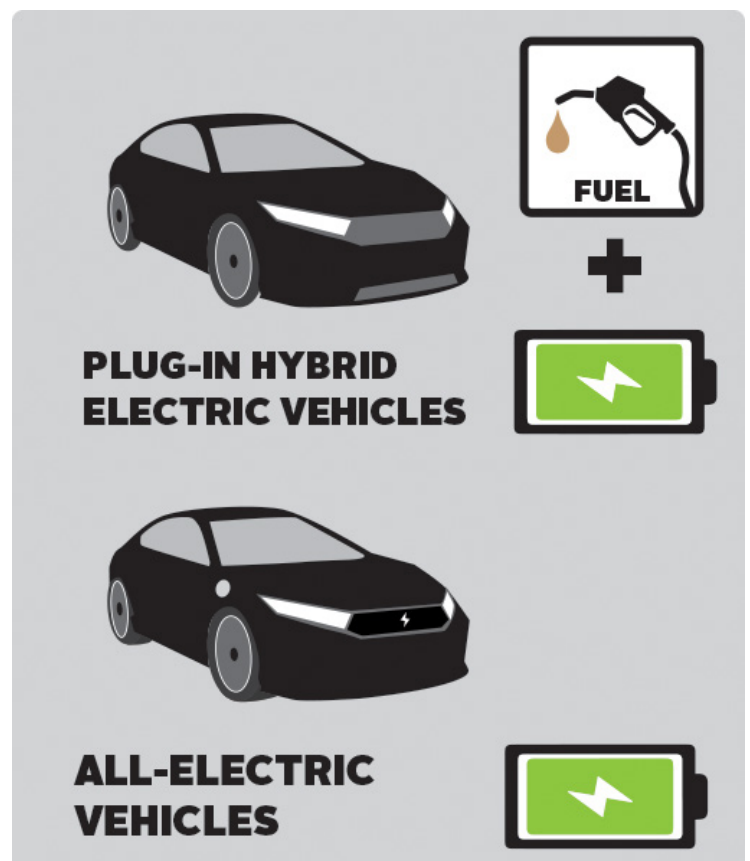
### Key Words

- ✓ EVs (all-electric vehicles)
- ✓ PEVs (plug-in electric vehicles)
- ✓ PHEVs (plug-in hybrid electric vehicles)

### PEV Fundamentals

Before learning about charging stations, it is valuable to understand what makes a PEV a PEV – its ability to charge from an electric power source by being plugged in. The two types of PEVs are EVs and plug-in hybrid electric vehicles (PHEVs).

All EVs, also referred to as battery-electric vehicles, run solely on batteries, which store electrical energy that powers the motor and produces no tailpipe emissions. Charging of the batteries occurs by plugging the vehicle into an electric power source.



<sup>1</sup>Matulka, Rebecca. “The History of the Electric Car.” Energy.gov. U.S Department of Energy, 14 Sept. 2014. Web. 15 Sept. 2015. <<http://energy.gov/articles/history-electric-car>>.

Also, EVs have the ability to charge by regenerative braking, which means the electric drive motors are used as generators and return the kinetic energy normally lost when braking to electricity for the electric supply system to run off of.<sup>2</sup>

Plug-in hybrid electric vehicles (PHEVs), also referred to as extended range electric vehicles, differ from EVs as they use both batteries and fuel. The batteries power the electric motor and the fuel powers the internal combustion engine. These types of vehicles are similar to EVs because they too can be plugged into an electrical source to charge. However, the battery life for PHEVs is normally shorter.

Drivers choose PEVs over PHEVs for many different reasons, including:

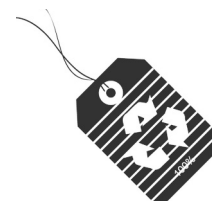
**Lower carbon footprint:**

Drivers want to minimize their carbon footprint as much as possible. PEVs are a stronger benefit to the environment compared with PHEVs because PEVs don't use any fuel at all, thus lessening pollutants that can harm the earth.



**Lower operating cost:**

The cost per mile to fuel a PEV is approximately one-third to one quarter the cost of gasoline (on a cost per mile basis).<sup>3</sup> Lower cost of maintenance and repair bills, aside from the occasional tire rotation.



**Higher performance:**

PEVs are smoother to drive. By removing the internal combustion engine driveline, it creates a high performance car with low center of gravity and provides maximum acceleration and handling.



**Compatible with most charging stations:**

All major vehicle and charging system manufacturers of PEVs have a standard connector and receptacle that can be used on any Level 1 or Level 2 charging station.



<sup>2</sup> Wikipedia contributors. "Regenerative brake." Wikipedia, The Free Encyclopedia. Wikipedia, The Free Encyclopedia, 14 Aug. 2015. Web. 15 Sep. 2015. <[https://en.wikipedia.org/wiki/Regenerative\\_brake](https://en.wikipedia.org/wiki/Regenerative_brake).>

<sup>3</sup> Berman, Brad. "Electric Cars Pros and Cons." PluginCars.com. PluginCars.com, 4 Oct. 2014. Web. 15 Sept. 2015. <<http://www.pluginCars.com/electric-cars-pros-and-cons-128637.html>.>

## Charging Fundamentals

EV charging stations can be installed just about anywhere electricity can be run – homes, apartment complexes, corporate campuses, college campuses, shopping centers, parking garages, etc. But before installing and using a charging station, it's important to understand the basics of the equipment.

There are different types of electric vehicle supply equipment based on communication capabilities and the time it takes to actually charge the vehicle itself. This equipment takes electrical energy from the electricity source it is plugged into, such as the electrical outlets at a shopping center parking garage. In order to guarantee that a safe flow of electricity is continually supplied to the various brands of PEVs charging, the supply equipment has to be able to communicate effectively with the PEV.

This equipment is classified into different categories by the degree at which the batteries are charged, with Level 1 and Level 2 being the most common types. Charging times differ as they are based on a variety of factors, including the battery type, how depleted it is, how much energy it can hold, and the type of equipment used by the charging station itself.

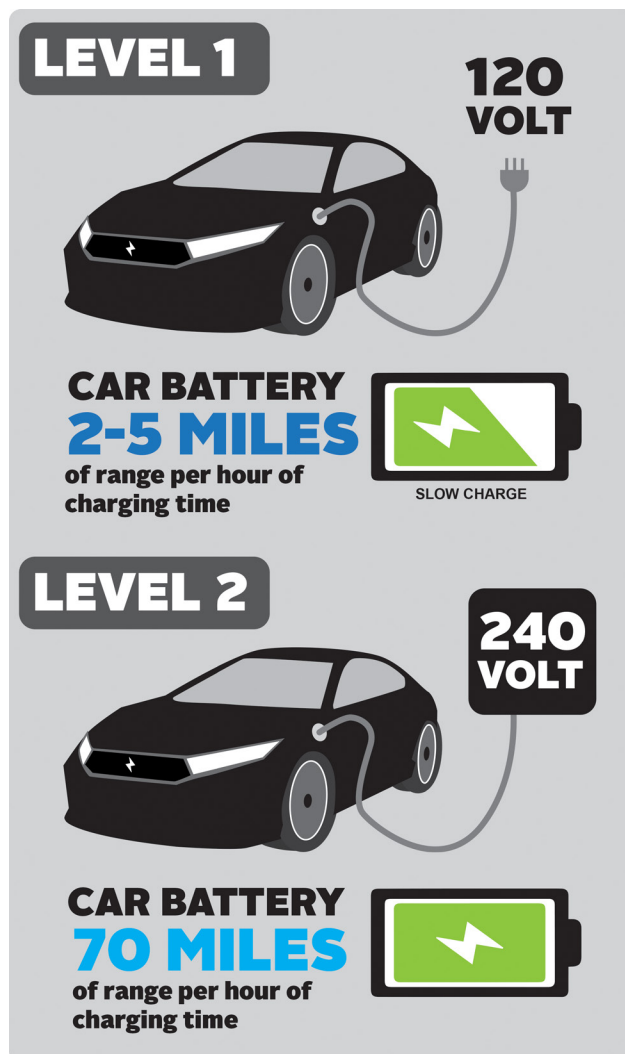
### Level 1:

- ✓ Typically installed in residential areas due to the lower amount of electricity allotted, meaning longer charging time required.
- ✓ Allows for a slow charging speed ranging from 2 to 5 miles of range per hour of charging time.
- ✓ Supplies 120-volt.

### Level 2:

- ✓ Supplies 240-volt, comparable to energy used by an electric dryer.
- ✓ Allows for a wide range of charging speeds, all the way up to 70 miles of range per hour of charging time.
- ✓ Charging is done through a box and a cord that waits to send power to the plug until it's plugged into an EV, improving safety.

Both Level 1 and Level 2 charging stations deliver standard household electricity to the car and electronics on board the car transform the wall power into the proper form to charge the battery.<sup>4</sup>



<sup>4</sup> Saxton, Tom. "Understanding Electric Vehicle Charging." Plug In America. Plug In America, 31 Jan. 2011. Web. 15 Sept. 2015. <<http://www.pluginamerica.org/drivers-seat/understanding-electric-vehicle-charging>>.

## Charging Station Benefits

There are many benefits that come along with the application of charging stations, whether at a premium retail center, grocery store, parking garage, entertainment venue, or airport.

### ✔ **Boost branding, customer attraction & retention:**

Offering charging stations are a great way to attract and keep customers who drive PEVs because locating a charging station is not always the easiest task. EV charging stations also give businesses a unique way to differentiate from competitors, and enhance and promote a positive, environmentally friendly brand image.

### ✔ **Digital or static advertising opportunities:**

Content options are nearly endless and all depend on the location of the charging station. Each time an EV owner charges their car, it becomes a perfect opportunity to advertise to that driver. For example, if a charging station is in front of a premium retail center, it is the perfect time to reach a highly valued demographic with paid advertising from store locations inside the retail center.

### ✔ **Reduce environmental footprint and save energy:**

According to Portland General Electric (PGE)<sup>5</sup>, about one-third of the country's greenhouse gas emissions come from transportation, and 60 percent of that is from vehicle use. Charging stations significantly aid in reducing carbon emissions and the more public stations installed, the more interested non-EV drivers will be to join the movement.



<sup>5</sup> "Electric Cars & Trucks: Driving Green | PGE." Portland General Electric. Portland General Electric, n.d. Web. 15 Sept. 2015. <[https://www.portlandgeneral.com/community\\_environment/initiatives/electric\\_vehicles/driving\\_green.aspx](https://www.portlandgeneral.com/community_environment/initiatives/electric_vehicles/driving_green.aspx)>

## Taking Charging Stations to a New Level

Digital displays enclosed within an outdoor charging station kiosk offer many benefits to the charging station manufacturer, signage manufacturer, advertisers, and end-users as compared to traditional charging stations with only a backlight and static signage.

A main benefit is that the opportunities for digital signage functionality are limitless. When enclosed in a charging station kiosk, the medium can be used to generate revenue through advertising, provide wayfinding and personalized guest service, provide corporate information for employees and more. A constant stream of fresh content can achieve high-quality communications to the specific target audience.

Other benefits include ease of use and reduced costs. Everything displayed is remotely controlled by a computer, reducing the overall costs of shipping, printing, processing and labor to change the messages on the screen. In a few clicks of a mouse, the content on the digital screen can keep up with the constantly changing promotions.

In this day and age, people want to see messages conveyed in a medium they know and expect, and that expectation is for fresh, updated, vibrant information. What better way to convey those messages than with digital displays enclosed within charging stations that are placed outside the front of shopping centers or grocery stores, for example.

Charging stations are the perfect place to advertise to each driver who pulls up to charge. A recent study found that sixty-three percent of adults report that digital signage advertising catches their attention more than any other method of advertising, and forty-four percent said they paid more attention to digital signage advertising more than any other method of advertising.<sup>6</sup> Whether the advertisement is for a partner EV company, stores inside the premium retail center, or for the charging station company itself, digital signage offers more advertisement space and potential for increased revenue.

The true takeaway is that the opportunities for functions and benefits for all parties involved are truly limitless. Digital signage can certainly be used to generate revenue through advertising, but moreover what retailers can and should offer shoppers is the experience of personalized guest service from the moment they step out of their car. From customized wayfinding, to exclusive promo codes, with digital signage enclosed inside charging stations, companies can create a 360-degree brand experience, allowing customers to interact with brands anywhere, at any time of day. A constant stream of fresh content on-demand is the expectation of customers and it is through outdoor signage that retailers can truly accomplish this.



<sup>6</sup> "Digital Out-of-Home Media Awareness & Attitude Study." Rich Media Technologies. SeeSaw Networks, Inc., 2007. Web. 15 Sept. 2015. <<http://www.richmediatechnologies.com/uploads/articles/pdf/Outdoor%20Effectiveness.pdf>>

## Kiosk and Display Considerations

There are many benefits that come along with the application of charging stations, whether at a premium retail center, grocery store, parking garage, entertainment venue, or airport.

Before investing in an outdoor kiosk and display for a charging station, there are a number of considerations that need to be made including:



### Kiosk considerations:

- Weather ratings are one of the most important considerations when choosing a kiosk. The best way to determine a kiosk's ability to withstand weather conditions is by referring to the Ingress Protection (IP) rating. The IP code classifies and rates the degree of protection provided against the ingress of dust and water. An IP68 rating is standardly recommended for this type of application.
- Ability to update content and monitor the status of the kiosk remotely via Wi-Fi or landlines.
- Configurable email alarms notifying the charging station company of any issues with the kiosk, i.e. power is down, an internal component has failed, a door is open, a concerning enclosure temperature, etc.
- Circulation fans to ensure proper operating temperature for the internal electronics.
- Lockable doors for security and kill switches outside the enclosure to shut off power during an emergency.
- Ability to integrate a display, media players, speakers, and more to provide a complete self-service experience for the consumers charging their PEVs
- Pre-assembled design to simplify on-the-job installation, eliminating the need for on-site engineers for assembly and reducing installation costs.

## Outdoor display considerations:

- Ability to withstand harsh outdoor elements, season changes, and large drops and rises in temperature (see previous explanation of IP ratings).
- Daylight readable full HD 1080p resolution for bright, crisp picture when installed in outdoor environments.
- An LED back light system, which ensures better uniformity of illumination and creates less heat.
- Designed for direct solar loads and temperatures ranging from -40°F to 140°F.
- Fully sealed design to prevent condensation from forming inside the display glass.
- Cooling, as air conditioners will need upkeep, require maintenance and consume significant power.
- Ambient light sensors to automatically and gradually adjust a screen's brightness at different times, based on surrounding conditions.
- Breakage-resistant safety glass to contend with vandalism.



## The Solution

To meet this need, Peerless-AV® has teamed with Volta Industries, Inc. to create custom Volta charging stations. The station design includes Peerless-AV's 47" Xtreme™ outdoor daylight readable display, a 6' tall backlit poster box, a Chromebox media player actively cooled inside the Peerless-AV Xtreme™ Outdoor Totem Kiosk, an EKM power meter, and a cellular modem. The cellular modem allows for real time content updates and power consumption records. The kiosk is all stainless steel and aluminum construction for corrosion resistance.



## About Peerless-AV

Peerless-AV, a Peerless Industries, Inc. company, is a leading designer, manufacturer and distributor of audiovisual solutions. From its award-winning mounts and wireless audio systems to indoor/outdoor kiosks and the industry's first fully sealed outdoor displays, Peerless-AV aims to Get it Right by fulfilling both integrators' needs for ease of installation and service, and end-users' dreams in residential and commercial applications.

Based in Aurora, IL, Peerless-AV manufactures over 3,600 products that serve original equipment manufacturers, commercial integrators and consumer retailers in 22 vertical markets through direct sales representatives and authorized distribution.

For more information, visit [www.peerless-av.com](http://www.peerless-av.com).



### ***The Get It Right Guy***

Todd Mares is the Director of Emerging Technologies Division of Peerless-AV, a provider of Professional Audio and Video Mounting Solutions, High Definition Wireless Delivery Solutions, and Professional Outdoor Display Solutions for Residential and Commercial Applications.