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## Questions

### You Should Ask When Considering EV Charging Stations

#### Challenge

You have electric vehicle (EV) drivers asking you to install EV charging stations in your parking lot, or you believe that having EV charging stations would increase tenant or employee attraction and retention. When it was just a couple of EV drivers, you could easily brush it off as not being a priority. Now, however, with EV sales rates growing at 440% between 2011 and 2013, and worldwide EV production set to go up 67% this year alone, you're either tired of hearing complaints from EV drivers or you see the value in being prepared for the on-coming demand. But how can you make sure you install the right charging stations for your organization, with the best charging station management software and network provider who can provide you with the highest Return on Investment (ROI) and the lowest Total Cost of Ownership (TCO)?

#### Introduction

As you begin to consider purchasing EV charge stations for your business or governmental organization, you will most likely head to Google or find out what your peers are doing. To aid in your research, we have provided six questions to ask as you get ready to make your EV charging station infrastructure investment.

### 1. Which charge stations are right for me?

There are many choices for EV charging station hardware these days, including chargers from global leaders, such as Eaton and GE, as well as established and respected smaller manufacturers. As the EV industry grows, charge station buyers are realizing that hardware parity will be here before they know it and the true differentiation comes from *the charge stations' management software and their provider's management services*.

## Charge Station Levels

It is important to understand that there are three EV charging level standards (**Figure 1**). These are categorized as Level 1, Level 2 and Level 3. They range from low-level electric power, typically 110 volt (which takes a long time to charge) to high-level electric charging delivery (also known as, “fast charging”). The table below details the features of each Level.

| Charge Level                               | Power Level                       | Charge Time                | Description  |
|--|-----------------------------------|----------------------------|--|
| <b>AC Level 1</b><br>Basic (slow) charging | 110-120V AC (alternating current) | Full charge: 10-20 hrs     | The power level is equivalent to plugging into a household electrical outlet. It is best suited for smaller battery sizes such as those in PHEVs or longer available charge times. |
| <b>AC Level 2</b><br>Fast charging         | 208-240V AC                       | Full charge: 4-8 hrs       | The power level is equivalent to plugging into a household electric clothes dryer socket. This is the most common commercial and public charging level.                            |
| <b>DC Level 3</b><br>Very fast charging    | Converts 480V 3-Phase to DC       | Full charge: 20-30 minutes | Best-suited for fast turnaround locations and fleet vehicle charging. DC Level 3 requires significant panel and service upgrades and consequently is the most expensive to deploy. |

Figure 1 – Three types of EV charging stations

Deployment costs and charge times have made Level 2 chargers the most pragmatic choice for businesses and governmental organizations today. That’s because each charging station may serve from 2-4 drivers daily, depending upon usage policies and/or EV charge times. Level 3 (L3) charging stations, while faster for most EV drivers, are expensive to purchase, typically cost much more to install, and some electric vehicles are not capable of charging at Level 3 stations.

### Smart or Dumb

There are two main types of Level 2 EV charging stations: “Dumb” and “Smart” or “Managed”. “Dumb” charge stations lack the components, software, and network connection to do anything “intelligent” beyond simply charging a vehicle. They are stand-alone, *non*-networked units with no ability to be remotely managed. Other than seeing a green light on the front panel of the charging station, there is no way to tell whether it is working or not working.

“Smart” or “Managed” chargers, by contrast, incorporate the hardware, software, and communications device necessary to connect it with a provider’s charge station management software. Charge station management software is a significant component of a charge station network, and provides “intelligence” to the charging station and infrastructure. Managed stations can be electronically monitored, observed, diagnosed and reset remotely. They have the ability to send immediate notifications should they stop working properly, and can provide reporting on items such as up-time, energy



usage, users, etc.

Non-networked charge stations are best suited for residential and small organizations that want to provide one or two charge stations for EV drivers to use at no cost. These charge station buyers typically see no need in the future to add more charge stations, nor do they need to control pricing or who is able to use the stations. Providing driver support or uptime monitoring are also not usually concerns for homes and small organizations.

## ***Driver Interface***

There are many manufacturing companies that make EV charging stations, each with slightly different ways of interfacing with users (drivers). For example, you may have a choice between letting drivers begin a charging session as a guest using a credit card, or as a charge station network's registered user with an EV charging station network RFID key fob or using a mobile app that scans a QR code on the charging station.. You can charge a user (driver) on a per use basis via a PayPal account or credit card, provide limited free charging, or any combination of the two. Some charge stations even offer a video display to enable advertising or other digital messaging.

## ***Single or Dual “Ports” (or a Hybrid of the Two)***

You can get a charge station with one plug (also known as a “port”) or two. Having two ports allow you to install one charging station between two parking spots (or even four if you have two rows of spaces adjacent to each other). Dual ports cost more, but are less expensive on a cost-per-port basis, and may be a better option for you in the long run. There are also two types of dual ports, one has full power to each port, while the other has one full power connection that both ports share depending on usage demand. If two cars are charging at the same time, they will only charge at half power and it will take longer to charge their vehicles.



## **2. Can you switch EV charging “networks”?**

Smart (managed) electric vehicle (EV) charging stations communicate through the Internet to charging station management software for the purposes of operating and controlling the charge stations. Charge stations’ communications capabilities and their cloud-based management software are collectively called a charge station “network”.

An [EV charge station network](#) is necessary to monitor charge station up-time, control access to charging, enable payment processing, capture driver and usage data for reporting, and to integrate with enterprise software systems beyond the charge station network – including utilities, building management systems, HR systems, customer loyalty programs, and other charge station networks.

## **Buyer Beware!**

If the first charge stations you buy operate on a network that does not allow you to switch providers when your service contract is up, then even if your charge station operator says their network is open, it's not. As the EV charging industry has seen recently with the second largest EV charging network provider declaring bankruptcy, the risk of stranded hardware assets is real if you purchase charge stations that only operate on closed (locked-in) networks. If your provider goes out of business, raises its rates, or provides inferior service, you will have the choice of sticking with their terms or replacing your charge stations altogether.

To enable that lock-in, all “networkable” EV charging stations have a device that runs a communications protocol (essentially a software language) to communicate through the Internet with a management software and services provider (**Figure 2**). This communications protocol provides a means for the EV charging station to “phone home” or be phoned by the provider’s management system.

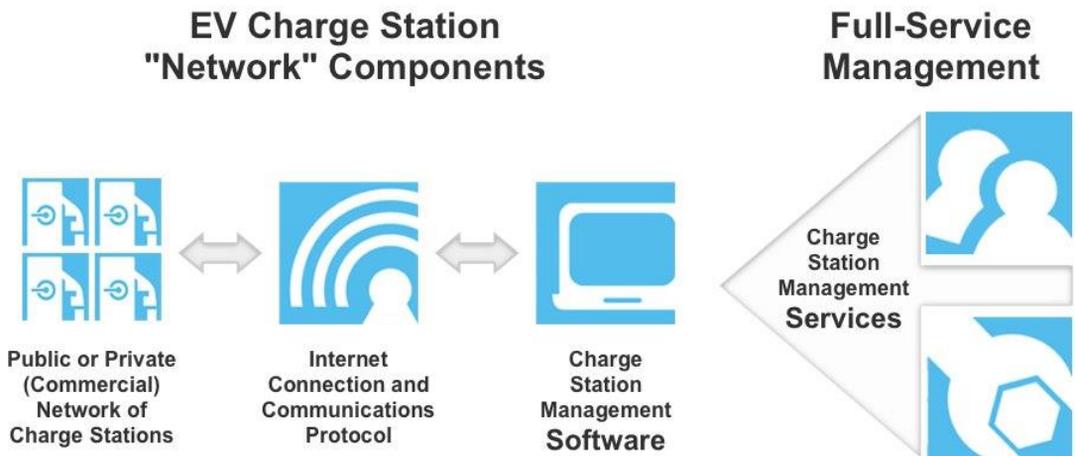


Figure 2 – Functional components of an EV charging station network

Some EV charging station manufacturers that are also software providers are incentivized to use closed or proprietary communications protocols that let their charge stations communicate only with their management software. This isn't the case with EV Connect. We use the Open Charge Point Protocol ([OCPP](#)) that enables charging stations to communicate with multiple network providers.

It's similar to whether or not you would prefer to buy a television that only works with one cable or satellite provider, or if you'd rather have a television that is capable of working with multiple providers.

It is important to be aware that some leading network providers say their networks are “open”, **but they are only open to other charge station manufacturers which enable their chargers to run on those proprietary networks.** You, as their customer, however, are locked into a contract with them for their network and only their network. When your contract expires, you can either renew with that provider or have the entire EV charging station infrastructure removed and replaced. With EV Connect, you can switch networks after your service contract is up – [guaranteed](#).

### 3. How much does installation cost?

The most significant cost of offering charge stations is the installation. Electric service upgrades, trenching, repaving, distance to panel, and other factors can significantly increase your costs of deployment. Working with your installer to plan ahead (**Table 1**) will enable you to consider how your first installations can reduce the costs of future deployments, including the ability to run power to additional future EV parking spaces ahead of time.

Installation fees may include labor performed by certified electricians, conduit, wire, panel upgrades, electric service upgrades by your utility company, and breakers, plus taxes and fees associated with any required permits. Moreover, on-site factors can drive up costs. These include the distance that a charge station is situated from a suitable electric panel and availability of good cellular connections.



| Goals & Program Planning   | Site Planning  | Installation   |
|--|--|--|
| <ul style="list-style-type: none"> <li>• Customer needs</li> <li>• Number of drivers</li> <li>• Usage/driver profiles</li> <li>• Utilization goals</li> <li>• Public, private or hybrid</li> <li>• Free or paid</li> <li>• Program budget</li> <li>• Managed in-house or outsourced</li> </ul> | <ul style="list-style-type: none"> <li>• Safety</li> <li>• Building codes &amp; compliance</li> <li>• Building permits</li> <li>• Cost minimization</li> <li>• Power availability</li> <li>• ADA compliance</li> <li>• Location prominence</li> <li>• Usage maximization</li> <li>• Installer accessibility times</li> </ul> | <ul style="list-style-type: none"> <li>• Safety</li> <li>• Licensed &amp; experienced installers</li> <li>• Cost minimization</li> <li>• Panel upgrades</li> <li>• Electrical service upgrades</li> <li>• Visual appeal</li> <li>• Installation consistency</li> <li>• Utility notification</li> </ul> |

Table 1 – EV charging station installation considerations

## 4. How many charge stations do I need?

There are a variety of ways to approach this important question. While reviewing the various approaches we outline below, you will benefit from keeping both your current and future EV charging needs in mind, even if you currently have very few EV drivers.

Consider how your initial physical installation impacts future installations, and how your choice in charge stations today limits or increases your options for future purchases. Additionally, your choice in network providers, charging station management software, and value-added services will greatly impact your organization's EV charging program.

### ***Just Install a Couple of Them***

Some facilities managers who only have a handful of EV drivers that want to charge at work will often purchase one or two “dumb” chargers to address the drivers' immediate demands and complaints. That option tends to be fine for smaller companies that don't care about who uses the charge stations or that they will be free due to the lack of access and pricing controls that come with charge station management software. It is, however, a poor strategy for organizations that see the potential need to scale up their EV charging station offering in the future.



### ***The Survey Says!***

We have dealt with a number of customers who surveyed their employees to determine how many employees currently own EVs and to see how many employees were considering – or at least open to considering – purchasing an EV. Understanding your current and future needs will arm you with helpful information about budget timing, infrastructure building, and more. We recommend that you conduct a survey of your employees, tenants and customers to determine their current and expected EV needs and desires.

### ***Throttling Back***

Reducing the amperage (amps) to your charging stations can be a variable in determining how many charge stations you should install. (We don't see customers doing this very often, but we present it for your background information, nonetheless.)

Adding full-power (approximately 30 amps) charge stations may bring your installation costs to an unacceptable level due to the need for major electric service and infrastructure upgrades. Having the ability to reduce the charge station amps that each charge station uses may allow

you to install more charge stations within your existing electric service infrastructure. The impact of reducing your charge station's power is that your charge stations will charge the electric vehicles at a slower rate, thus increasing the time to charge a single vehicle and reducing the number of drivers who can use a charge station in a given day. You'll need to consult with your electrical contractor and/or electric utility company to determine if this is a viable option. As we said, we don't typically see this reduction in amperage per station happening very often.

## ***The Budget Decides and the Test Guides***

Many companies and organizations are on an annual budget cycle and may not have budgeted for EV charge stations yet. Taking the test-and-learn approach can let some organizations spend less in the short-term on a smaller number of charge stations. When the next budget cycle approaches, they can then evaluate the results and determine how many additional charge stations and/or electric infrastructure upgrades they need to make.

## ***Station Utilization Tools***

One EV charging company that is both a charge station manufacturer and a closed-network service provider says that its customers should adhere to a 2:1 driver-to-charger ratio. While that may be a good and expensive goal, our customers want to do more with less budget, especially during these early days of electric vehicles. We take a unique approach to one-size-fits-all ratios by offering our "Station Utilization Tools" to help your organization efficiently maximize the usage of each of your stations before buying more. Among other capabilities, these tools provide analytics and reporting to help indicate when your stations are consistently at maximum capacity and when additional stations are truly needed.

## **The EV Connect Way**



Since none of us can predict the future, we take a different approach to helping you determine how many charging stations your organization needs. Our EV charging solutions are designed to give you the most flexibility possible both now and in the future.

At some point, you may want to switch manufacturers in order to take advantage of better features, service quality and/or pricing. If you are locked into your existing provider's network (as described above), you may not be able to purchase another hardware brand and have them work with your existing stations. However, when you use an open network provider like EV Connect's, you have the flexibility to switch charge stations and networks.

Another part of our "future-proofing" flexibility is our "Station Utilization Tools" that include

analytical and Driver-to-Driver™ tools to give your drivers the ability to efficiently utilize a limited number of EV charging stations. Your EV drivers will be better served if they don't have to waste time creating and managing an email list of all of the EV drivers at a particular location, writing nasty notes on windshields, or running outside to see if a charge station is available.

## 5. How am I going to manage them?

When people first begin to research charging stations, they are typically unaware of a charging station's management software and operating capabilities. Charge station management software allows real-time monitoring, reporting, driver accessibility, management, and more. When you consider providing phone and email support for your EV drivers in case they have any technical or network issues, then you may begin to feel overwhelmed by the complexity and effort required to manage your EV charging station infrastructure. But it doesn't have to be that way!



We have found that many companies and governmental organizations do not want to devote scarce staff time to dealing with EV chargers or drivers. That's why EV Connect offers 100% complete [management services](#). Our management services are designed to help our customers develop, implement, manage, and maintain a cost-effective EV charging program for their employees, tenants or EV-driving constituents.

## 6. How do I get a high ROI and a low TCO?

When thinking about charge station Return on Investment (ROI), many people assume we are talking about billing EV drivers for usage of the charging station. Marking up electricity may sound like a good business, but when you consider the costs of hardware, installation, management software and service, you may not see much of a future in it. We believe your ROI will come from other sources, including:

- Improved employee and/or customer retention.
- Increased visibility into vehicle or driver costs and behavior.
- Unlocked hidden value through enterprise system [integrations](#).
- Differentiation between your property and your competitor's facilities.
- Marketing partnerships with neighboring retail outlets.
- Enhanced brand perception through positive PR value and sustainability efforts.

On the cost side of the equation, to reduce your long-term costs, your charging station solution

should be weighted towards the provider that gives you the most flexibility to adapt to your organization's changing EV charging needs.

We believe Total Cost of Ownership (TCO) reductions will come from:

- Choosing a partner capable of full-service management and support.
- Reducing the over-buying of charge stations.
- Avoiding stranded charge station assets by purchasing charging stations with an open network capability.
- Taking advantage of EV Connect's ["Switchable Network Guarantee"](#).

## BENEFITS of Providing EV Charging Stations

### Facilities Benefits

- LEED points available
- Cost savings
- Integration into building and parking management systems
- Enhance your company's brand as socially and environmentally responsible
- Help achieve company's sustainability goals

### Sustainability Benefits

- Part of a comprehensive green strategy
- LEED points available
- Results reporting with carbon-offsetting comparisons

### HR Benefits

- Shows employee responsiveness
- Cost-effectively attract and keep great employees
- EV drivers more educated and stable talent pool
- Reduce costly employee churn
- EVs are part of an overall transportation strategy
- Ability to charge employees or not for usage
- Enhance and promote a positive brand image

### About EV Connect

EV Connect has created the most innovative, robust and feature-rich cloud-based software platform for managing electric vehicle (EV) charging stations, their interaction with utilities and the driver experience. The company leverages this software platform to also be a leading provider of electric vehicle (EV) charging solutions for commercial, enterprise, hospitality, university and government facilities.

Established in 2009, EV Connect's customers include Yahoo!, Marriott, Hilton, Western Digital, Electrify America, ADP, Los Angeles Metropolitan Transportation Authority, New York Power Authority, and numerous municipalities.

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