



## PLANNING FOR A CHARGING STATION

### Electric Vehicle Training Series Script



#### **Slide 1 - Introduction**

Welcome to the first presentation in the charging station training series. This session is entitled “Planning for a Charging Station.” It is designed to help fleet managers determine what type of electric vehicle charging infrastructure will best meet agency needs and how to plan for purchasing and installing a station. Other training presentations in this series cover installing and operating electric vehicle charging stations. For more information on electric vehicles, be sure to check out our trainings on “Choosing an Electric Vehicle” and “Operating an Electric Vehicle.” They are available through GSA Fleet’s Drive-thru training page.

#### **Slide 2 - Agenda**

In this presentation, we will address Executive Order 13693 and how it applies to charging infrastructure. Then we will provide an introduction to the three types of charging equipment types currently available, how they differ, and considerations fleet managers should keep in mind when determining agency charging needs. The bulk of this presentation will then address how to plan for a level 2 charging station. We will present five steps that agencies should take before selecting and ordering a charging station. Then we will cover how agencies can order charging stations from GSA. Finally, we will provide some lessons learned from our electric vehicle pilots and some resources for fleet managers.

#### **Slide 3 – Acronyms and Definitions**

Before we get started, let’s go over some acronyms related to electric vehicle charging infrastructure. Electric Vehicle Supply Equipment, or EVSE, is an industry term that refers to charging stations and related equipment used to charge an electric vehicle. In this presentation, we will primarily use the term charging station to refer to EVSE. For the purposes of this presentation, the term electric vehicle, or EV, encompasses both battery electric and plug-in hybrid electric vehicles. These are the vehicles that utilize charging infrastructure.

#### **Slide 4 – Executive Order**

Executive Order 13693 was signed by President Obama in March 2015. In addition to setting Federal fleet emissions standards, it directs GSA to ensure that charging stations with the capability to report asset level data are available through GSA. Furthermore, it directs agencies to procure charging stations that allow for vehicle level data reporting. This presentation will include information about charging stations

available through GSA and is designed to help agencies make charging infrastructure decisions in response to executive order 13693.

### **Slide 5 – Types of Electric Vehicle Charging**

There are three different levels of electric vehicle charging. Each level uses a different amount of electricity, which impacts the rate at which an electric vehicle is charged.

- Level 1 charging can be done through a basic wall plug. This type of charging does not require additional infrastructure beyond access to an electrical outlet. Level 1 stations are cords that can plug into any 120 volt outlet and come standard with the vehicle, although there are also Level 1 charging stations commercially available and on GSA Advantage. Level 1 charging uses 120 volts of electricity to charge an EV battery. All electric vehicles currently available through GSA come standard with a 120-volt charging cord. This form of charging takes the most amount of time to recharge a vehicle battery. For each hour that a vehicle is charged through a level 1 outlet, it gains 2 to 5 miles of range. For the electric vehicles currently available through GSA, it would take anywhere between seven and 21 hours to fully charge the vehicle battery using a level 1 station.
- Level 2 charging typically requires the installation of additional charging infrastructure. It provides vehicle charging at 240 volts. This extra power means that vehicles will charge more quickly than on level 1. For each hour that a vehicle is charged through a level 2 outlet, it gains between 10 and 20 miles of range. For the electric vehicles currently available through GSA, manufacturers estimate that it takes anywhere between two and five hours to fully charge the vehicle battery using a level 2 station.
- Finally, level 3 stations offer the fastest charging time available. These charging stations typically use 480 volts of power to fully charge an electric vehicle in less than an hour. However, not all electric vehicles can be charged on a level 3 station. In fact, none of the four 2016 EV offerings are compatible with level 3 stations. Level 3 charging can be used by some recent models of the Nissan Leaf. Operators are advised to consult with their vehicle manual before plugging into or purchasing a level 3 station. Because of the high voltage used to charge vehicles on a level 3 station, manufacturers warn that level 3 charging should be done sparingly and only when needed because of the strain placed on the battery.

### **Slide 6 – Why Charging Stations**

The big advantage of using a level 2 over a level 1 charging station is the faster charging time. Charging stations at all levels can include data subscriptions that allow fleet managers to collect vehicle level charging data. However, not all stations come with this feature. When selecting a station vendor, fleet managers should take this into consideration. Additionally, some level 2 charging stations come with two charging

ports, so two vehicles can charge from the same station. This is ideal for agencies with multiple electric vehicles in their fleet. Finally, when wall outlets are not accessible to the parking location, charging stations provide convenient access for electric vehicle charging where charging would not exist otherwise.

### **Slide 7 – Determine Agency Needs**

Charging infrastructure can come at a high cost to agencies. To ensure prudent use of taxpayer dollars, agencies should first determine their vehicle charging infrastructure needs. Each agency fleet is unique and all factors should be taken into consideration. When determining your location's needs, be sure to include building managers, program managers, and headquarters in the conversation to ensure that everyone is on the same page. Things that should be taken into consideration when determining whether to install charging stations include the agency's current electric fleet size and make up. Charging times are different for plug-in electric vehicles than all-electric vehicles, so the number of stations will not only be dependent on the number of vehicles but the length of charging. Agencies should also take into consideration future electric vehicle use. Executive Order 13693 implemented ambitious guidelines for zero emission vehicle acquisitions over the next nine years. Planning for future infrastructure needs will ensure that your agency is prepared to meet the executive order mandates. Agencies should also take into consideration their location and building. Charging stations are long-term investments, so if there is a plan for agency relocation in the near future, the cost and benefits should be weighed for installing infrastructure. While charging stations may be relocated, this can result in significant costs to the agency. For agencies located in federal buildings where multiple Federal agencies reside, fleet managers should consider opportunities for infrastructure and cost sharing. Furthermore, for agencies where vehicles travel similar routes from day-to-day, alternative locations for charging stations and the availability of public infrastructure should be taken into account. In addition to the size of agency electric vehicle programs, agencies should consider current and future funding for charging station infrastructure. Part of the planning process should take into account not only the funding available in the current fiscal year, but future funding and budget requests.

### **Slide 8 – Determine Agency Needs**

Once agencies have determined a need for charging station infrastructure, the number and types of stations should be taken into consideration. In order to determine the number of stations needed, agencies should plot the use and time requirements for each electric vehicle in their fleet. This could encompass the average miles driven per vehicle per day, the average length of time required to re-charge the vehicle using level 1, level 2, and level 3 stations based on the charging times included on slide 5, and the time of day or schedule that vehicles would be charged. As part of determining the agency need, future electric vehicle usage should also be taken into consideration. If it is determined that more than one station is needed, agencies should consider dual port

stations that can charge two vehicles for just a little more money than a single port station. Furthermore, some charging station manufactures have special station equipment that can network multiple stations together, reducing the cost when multiple stations are installed within close proximity of one another. For most charging stations, close proximity is equivalent to 100 feet within line of site.

### **Slide 9 – Locate Existing Charging Stations**

One thing to consider before purchasing and installing charging infrastructure is the availability of public charging stations. There are four different resources listed here that fleet managers and drivers can use to locate nearby charging infrastructure. GSA's WEX Fleet Card is the form of payment agencies are required to use to pay for charging their vehicle, if the stations are pay for use stations. The WEX Connect mobile app has a station locator that identifies stations where WEX charge cards are accepted. The widely used ChargePoint network does not currently accept WEX as a form of payment. Agencies that have ChargePoint RFID cards can charge at any free public ChargePoint station using those RFID cards. ChargePoint stations can be located on the ChargePoint website or app. The Department of Energy's Alternative Fuels Data Center has a station locator that includes station information, hours of operation, and contact information. Finally, Google Maps has also started tracking charging station locations. Just type "EV charging stations" into the search bar. None of these resources is completely exhaustive and each one may produce different results. Consider testing all four to see which resource is the most reliable in your area. Finally, consider whether agency sharing is possible. If located in or near a federal building or building with tenants from other federal agencies, determine if sharing agreements are possible to reduce costs.

### **Slide 10 – GSA Acquisition Solutions**

If an agency has determined that it requires charging infrastructure, GSA has multiple acquisition solutions to choose from. As part of the executive order, GSA is mandated to ensure that charging stations with vehicle level data reporting capabilities are available to Federal Agencies. In fiscal year 2016, agencies can order charging stations through GSA. GSA will acquire the level 2 charging stations on behalf of the agencies using an existing blanket purchase agreement with Apollo Sunguard. The BPA is for ChargePoint stations and includes in the cost one year of data subscription. Stations will be delivered within 45 days of the order placement. For more information on this acquisition solution, contact the GSA Fleet AFV Team. In fiscal year 2017, GSA expects to have a multiple award, self-service BPA for agencies to use to acquire charging stations.

### **Slide 11 – Planning for Your Station**

Before ordering a charging station, agencies should do proper planning to ensure that there are no problems with installation or funding. Based on the results from GSA Fleet's Electric Vehicle Pilot Programs, we have identified five key steps for agencies to

take when planning for charging infrastructure. The remainder of this presentation will focus on these five steps: site planning, calculating installation costs, thinking through agency long-term needs and factors, station requirements, and funding availability and accessibility.

### **Slide 12 – Step 1: Site Planning**

It is essential that you begin the planning process with proper site planning. We recommend that you involve three stakeholders in that planning process: your building manager, your building electricians, and your installation vendor. You will need to include all three stakeholders in the upfront planning stage to the greatest extent possible. The building manager, electricians, and installation vendors will be able to validate your plans and may recommend better ways to install the stations and at a cheaper cost. It is recommended that agencies obtain at least three cost estimates and seek recommendations for the station location, type, and total cost of installation. Agencies should plan for data requirements at this point, testing for cellular reception and wireless connectivity capabilities. Finally, agencies should ensure that the charging station plan is in line with the agency vehicle allocation methodology and electric vehicle acquisition and deployment plan.

### **Slide 13 – Step 1: Site Planning**

When planning for the location of your charging station, there are some factors that we recommend you take into consideration. First and foremost is convenience. If charging stations are located far away from the building entrance or in areas that are difficult to access, drivers may not use the electric vehicles to their fullest extent, limiting your return on investment for both the station and the vehicle. Second, be sure that the charging station is free of hazards. Station cords and wires should not interfere with pedestrian or motor vehicle traffic. Third, when possible, consider placing stations in covered parking structures. Not only will this make vehicle charging easier during bad weather events, but it could also extend the life of the charging station by reducing wear and tear from the elements. Fourth, take into consideration irrigation and water drains. Keeping charging stations away from areas where water tends to pool will make vehicle charging more comfortable and convenient for vehicle operators. Fifth, consider curbs, wheel stops, and setbacks to prevent vehicles from colliding with and damaging station equipment.

### **Slide 14 – Step 1: Site Planning**

Additional considerations when determining station location include electric vehicle signage that designates parking spaces with charging stations as electric vehicle only parking. Also, consider the potential for vandalism and think through strategies to prevent property defacement. When possible, place stations under street or parking structure lighting and in locked or guarded enclosures. Finally, charging stations must comply with the Americans with Disabilities Act as well as state and local accessibility

laws. Compliance measures include adjustable receptacle and connector heights, cutting curbs, and providing handicap-accessible parking spaces.

### **Slide 15 – Step 2: Installation Costs**

The second step when planning for a charging station is to think through the installation costs. Agencies should look to market research and experienced contractors in their location to get a baseline for average costs. Installation costs will vary depending on geographic location as well as the building location and type of charging station to be installed. In GSA Fleet's Electric Vehicle Pilot, the average cost of installation was just under 3,000 dollars and typically ranged between 1,000 dollars and 5,000 dollars. However, we saw cases where installations exceeded 20,000 dollars due to complications with the grid placement in relation to the installation location. Things like building infrastructure and proximity to conduit and wiring can substantially impact installation costs. Some of these costs can be avoided with better site planning. Agencies are encouraged to consider multiple options in order to bring costs down, such as the station location and mounting type.

### **Slide 16 – Step 3: Think Long Term**

Third, planning for your stations requires long term vision. The first, and sometimes most difficult, part of long term planning involves agency location and the potential for relocation. If an agency is in a temporary building or plans to move locations in the near future, investing in pricey charging infrastructure probably does not make sense. In GSA Fleet's Electric Vehicle pilot, we saw cases where missions changed and agencies had to move their stations to other locations or simply abandon them and purchase and install new stations all together. This is an expense that should be avoided when possible. Another long term consideration is how to factor in and pay for electricity costs. Our market research has shown that most commercial charging stations do not come equipped with credit card swipe capabilities and instead the electricity usage costs show up in your monthly utility bills. This makes setting up a "pay for service" system on your stations difficult. However, we can assure you that our Fleet card provider, WEX, is working with several vendors, to accept payment. Local agencies looking to install charging stations should work with their headquarters to determine how charging stations fit into the overall agency greening goals. Current and future fleet size will be a large factor in determining the quantity of stations purchased. In our experience, we have found that it is less expensive to install extra panel and conduit capacity during initial construction than to have to modify the site later to accommodate for more charging stations.

### **Slide 17 – Step 3: Think Long Term**

Finally, agencies should consider whether future personally owned vehicle or employee workplace charging will be offered. In December 2015, President Obama signed the FAST Act which authorizes agencies to install charging stations for personal use by



employees on a reimbursable rate. Planning for workplace charging options should be done in parallel to agency fleet charging station planning.

#### **Slide 18 – Step 4: Finalize Requirements**

The fourth step is to go back and finalize station requirements. Agencies should decide on the station mount type, single or dual port equipment, and data requirements. These decisions should be based on the installation estimates and when possible should be the lowest cost options. This is the step just before purchasing the station. Therefore, project goals should be clearly communicated with agency managers and Fleet personnel to make sure everyone is on the same page before funds are committed. It is important that the project manager maintains good relations with the charging station vendor, knows the right points of contact for troubleshooting, and has arranged for training fleet operators and fleet managers to understand how to access charging data. GSA Fleet's Alternative Fuel Vehicle Team has most of these materials available and can serve as a resource.

#### **Slide 19 – Step 5: Ensure Availability of Funding**

After finalizing all of the station requirements, it is imperative to confirm that funding is available, accessible, and authorized for use on charging stations and installation. Based on our experience, it is recommended that agencies leave room in the project budget for unexpected installation costs.

#### **Slide 20 – Ordering a Charging Station**

Once the five planning steps are completed, agencies can acquire charging stations through GSA in one of two ways. The first option is what we call the Self-Service option. This is where agencies would complete their own contracting actions and seek to purchase stations directly off of the GSA Schedule through GSA Advantage. Agency contract staff would be involved to complete these orders off of the Multiple Award Schedule, which includes obtaining three competitive pricing quotes from three different vendors. The benefit of this option is that some of the vendors on Schedule include installation services in their pricing. In addition, some vendors also include data plan coverage with their stations as well. The second option available in fiscal year 2016 is to come to GSA Fleet to place these orders on behalf of the agency. This is the full service BPA offering mentioned earlier. Agencies simply fill out our order form and submit it to [gsafleetafvteam@gsa.gov](mailto:gsafleetafvteam@gsa.gov). We place the orders for you and work with the vendor on delivery. These stations come with one year of data included, which can be renewed after one year. This data subscription includes the capability for data to be uploaded into GSA Fleet Drive-thru for GSA Fleet leased vehicles.

#### **Slide 21 – Self-Service (Option 1): Manufacturers on Schedule**

This chart provides a snapshot of the EV charging station vendors that are currently on the GSA Schedule and their average price range for single and dual port stations.

Through the self-service option, agencies can access any of these manufacturers and vendors through GSA Advantage. However, if taking the full service route where GSA places the order, options are limited to the ChargePoint stations as listed on Schedule 23V offered by Apollo Sunguard. Data plans can be offered by the manufacturer or by other companies. Some are included with the initial cost of the hardware and some are separate, but almost all are subscription-based. Therefore, subscriptions must be renewed from year-to-year in order to continue recording vehicle-level charging data.

### **Slide 22 – Full-Service (Option 2): Available Charging Stations**

GSA's BPA with Apollo Sunguard includes three different styles of charging stations to meet customer needs. All of the stations are Level 2, which means that they use a 240 volt connection and will charge faster than a standard wall plug. Charging stations average between two and five hours of charging time with a 240 volt cord versus seven to 21 hours for 120 volt cords. Also, the 240 volt cords allow for the transfer of data from the charging station to the station software. The bollard or pedestal style mount is primarily used in open areas where there are no walls or poles for attaching the charging station, for example an open parking lot. The bollard mount is available with a single or dual port. Dual ports allow for two vehicles to be charged at once and require two dedicated EV parking spaces. The dual port is ideal for locations with more than one plug-in vehicle, as it offers double the charging ability at a lower cost than two single-port stations. The wall mounted charging station (item number CT4023) must be attached to a wall, such as a parking garage, and is only available with a single port. This model is more affordable than its single port bollard counterpart, so when possible this option is preferable.

### **Slide 23 - Full-Service (Option 2): How to Place an Order**

If going the full-service route and ordering off of GSA's BPA with Apollo Sunguard, send an email to the AFV Team at [GSAFleetAFVTeam@gsa.gov](mailto:GSAFleetAFVTeam@gsa.gov) to receive an order form. Complete the form and return it to GSA. Stations are delivered within 45 days of order placement and customers will receive an invoice from GSA upon delivery.

### **Slide 24 – Lessons Learned from Pilot**

Before ending the presentation, we would like to share some additional lessons learned from our Electric Vehicle pilot project. We determined that charging stations are best suited for locations where vehicles average 8,000 miles or more per year for greatest return on investment. Per Federal regulations, charging stations must be set on private access when activated. When set on private access, they can have a free pricing policy if only used by Federal fleet vehicles. Fleet managers should ensure that stations are located in areas that work for the driving patterns of the vehicles, keeping in mind the number of miles vehicles are driven in a day and the typical routes that drivers take. Finally, maintaining good relations with the vendor and subcontractor throughout the course of the project and ensuring that all parties are on the same page throughout the



project are important to make sure that there are no surprises when the station is delivered and installed.

### **Slide 25 – Resources**

This concludes the first part of our charging station training. If you have questions regarding any of the content included here or about charging stations in general, please reach out to the GSA Fleet Alternative Fuel Vehicle Team at [GSAFleetAFVTeam@gsa.gov](mailto:GSAFleetAFVTeam@gsa.gov). Some additional resources available to fleet managers are linked here, including some case studies about fleet charging station infrastructure use in California, Texas, and Colorado. We encourage you to take the other parts to this training entitled “Installing a Charging Station” and “Using a Charging Station” as well as other presentations in our electric vehicle training series for important details about how to choose and operate an electric vehicle.