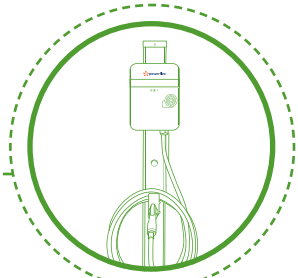


+ E-BOOK

Selecting Chargers for Light- and Medium-Duty Commercial Fleets

12-Minute Read



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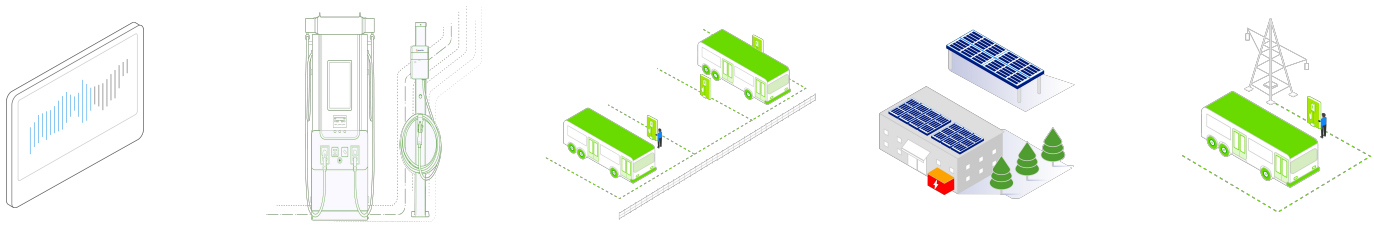
Commercial fleets require carefully planned and reliable charging solutions to ensure smooth, cost-effective operations. As EV charging technology continues to evolve, there's a growing variety of makes, models, and types of chargers from which to choose. Making the right choice takes a deep understanding of fleet operational needs, chargers, electrical infrastructure, and much more.

PowerFlex takes a hardware-agnostic stance on chargers for fleets, meaning that we want to support customers in choosing the best available charger models for their specific use case, without playing favorites. With more than 70,000 chargers under management, we have an unparalleled depth of experience and expertise. We often provide detailed charging simulation services to fleet operators to help them determine the optimal mix of charging equipment and estimate charging costs for their fleet.

Taking insights from hundreds of simulations, this e-book summarizes how we advise our fleet customers to think about charger selection. We've broken the considerations into five categories: compatibility (with the vehicle and electrical service), charger speed, AC vs. DC, physical considerations, and V2G capability. We have also provided a list of charger types that we currently recommend to commercial customers, grouped by power level.

Charger Selection Journey

Options narrow along each step of the journey.



Compatibility → Power Level & Charging Speed → Charger Type AC vs. DC → Physical Considerations → Vehicle-Grid Integration

Compatibility

Selecting chargers that are compatible with onsite electrical infrastructure and the fleet's vehicles is a critical consideration.

Vehicle Compatibility

Since the electrical grid provides AC (alternating current) and a vehicle's battery accepts DC (direct current), there must be a conversion for the charger to deliver power to the vehicle. The difference between AC and DC charging lies in the location of that conversion. For DC chargers, the conversion happens inside the charging unit itself, whereas AC chargers require an EV to have an onboard charger — a piece of hardware built into the vehicle's power system that converts AC to DC.

Virtually all light- and medium-duty electric vehicle manufacturers include onboard chargers in all their models, meaning they are compatible with AC chargers. In addition, vehicle models often vary in the maximum power that they can accept from chargers, placing limitations on the types of chargers that work with each vehicle. Review the vehicle tables later in this e-book for OEM-level data on the maximum vehicle acceptance rates for AC and DC charging.

Electrical Compatibility

For an EV charger to be electrically compatible, input voltage of the charger must match the voltage of the site's electrical service. In the United States, most residential and smaller commercial electrical services receive 240V power. Larger commercial and industrial buildings often have 480V electrical service. Unless a facility or fleet yard has large machinery or other power-intensive equipment, many will have 240V service.

All AC chargers have an input voltage of 240V, making them more affordable and simpler to install on existing electrical panels at most sites. With very few exceptions, DC chargers have an input voltage of 480V, which may require a transformer to increase voltage or new electrical service brought in from the local utility. Regardless of the voltage of the existing electrical service on site, it is critical to check the specifications of a charger to determine if its input voltage is compatible with the electrical infrastructure that will be used to feed the charger.

Power Level & Charging Speed

The power output of any charging station is a key factor in determining how quickly it will charge a vehicle.

A charger's power is measured in kilowatts (kW) and can range from about 5 kW to over 350 kW. Vehicle battery capacity, on the other hand, is measured in kilowatt-hours (kWh) and can range from approximately 50-100 kWh on the light-duty side, and from 100-300+ kWh for heavy-duty vehicles, depending on the vehicle and manufacturer.

Battery capacity can be thought of as the equivalent of a vehicle's fuel tank size. The more powerful the charger, the faster it can fill the battery with energy. For example, if a vehicle has a 100-kWh battery, a 50-kW charger will add 50 kWh, or 50% of the battery, in one hour. A 25-kW charger would take two hours to charge the same amount. Knowing the typical schedules for your fleet operations and the amount of time vehicles sit idle at the fleet yard (dwell time) helps narrow down the common range of charging power required to ensure smooth vehicle operations to roughly 10-100 kW. Depending on the route length and vehicle type, some electric vehicles may have sufficient range to complete their daily routes without requiring midday charging. In this case, a lower-power AC charger in the 10-kW range would be a simple, low-cost solution. Vehicles that serve longer routes may require midday charging to complete an afternoon trip, so a low-powered DC charger for a faster recharge in the middle of the day would be a more suitable option. The maximum power of most AC chargers is 19.2 kW, while DC chargers typically start at around 20 kW. Finally, vehicles used for long routes or multiple intermittent routes (such as delivery and logistics businesses) may require faster DC chargers to charge quickly, as schedules dictate. For these use cases, 60-100-kW DC chargers could replenish a significant portion of the battery in just one hour.

There is a wide range of use cases for businesses and organizations operating light- and medium-duty vehicles as part of their fleet. In most cases, businesses can charge overnight and often rely primarily on AC chargers. However, there are cases, such as in last-mile delivery, where a vehicle may need to be charged quickly midday. In those cases, a mix of AC and high-powered DC chargers should be considered.

Insight

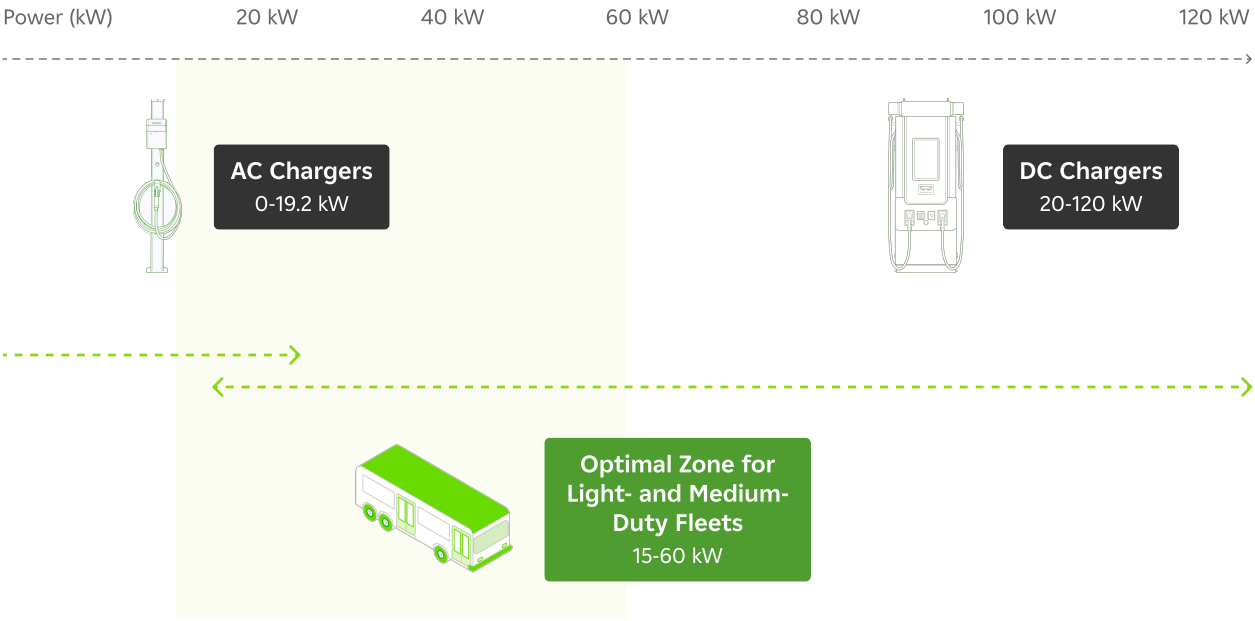
Many of our commercial fleet clients have limited capacity at their facilities. If you add up the total power of the chargers you want to install and that number exceeds the remaining power on your electrical panel, you'll need a charge management system like ChargePilot® by PowerFlex with advanced load management capabilities.

Charger Type: AC vs. DC

As mentioned, one basic way to categorize EV chargers is whether they deliver AC (alternating current) or DC (direct current) power. Let's dive a little deeper.

AC and DC chargers are also called Level 2 and DC Fast Chargers (DCFC), respectively. An AC charger relies on a vehicle's onboard charger to convert AC power from the grid into usable DC power. This makes AC chargers generally more affordable and simpler to install — but they charge at slower rates (19.2 kW max.).

DC chargers deliver DC power directly to the battery, allowing them to charge at significantly faster rates. But since the AC-to-DC power conversion happens inside the charger, DC units are typically more expensive and can be more complex to install, although a charge management system (CMS) can significantly reduce those challenges.



Based on our experience operating thousands of charging sites and delivering hundreds of charging simulations, we have found that the sweet spot for fleets comprised of mostly light-duty vehicles is 19.2 kW AC up to 30-60 kW DC. However, if a fleet contains more medium-duty vehicles or has a need to charge midday, we would recommend higher-powered DC chargers (60-100 kW) to complement your Level 2 chargers.

Maximum vehicle acceptance rates for AC and DC charging

Maximum AC and DC rates may vary by package, model year, and battery pack configuration. Check with OEM or vehicle dealers for latest specifications on updated models.

Light Duty

OEM	Ford	Chevrolet	Mercedes Benz	Rivian
Model	F-150 Lightning	Brightdrop ZEVO 40	E-Sprinter	EV 500, 700
Max AC Charger Rate	19.2 kW	19.2 kW	9.6 kW	11.5 kW
Max DC Charger Rate	182 kW	120 kW	50 kW	100 kW

OEM	Ford	Chevrolet	Mercedes Benz
Model	E-Transit	Brightdrop ZEVO 40	E-Sprinter ER
Max AC Charger Rate	11.3 kW	19.2 kW	9.6 kW
Max DC Charger Rate	115 kW	120 kW	115 kW

Medium Duty

OEM	Workhorse	Isuzu	Freightliner	Motiv
Model	W56	NRR EV	eM2	Step Van
Max AC Charger Rate	19.2 kW	19.2 kW	19.2 kW	19.2 kW
Max DC Charger Rate	130 kW	80 kW	180 kW	160 kW

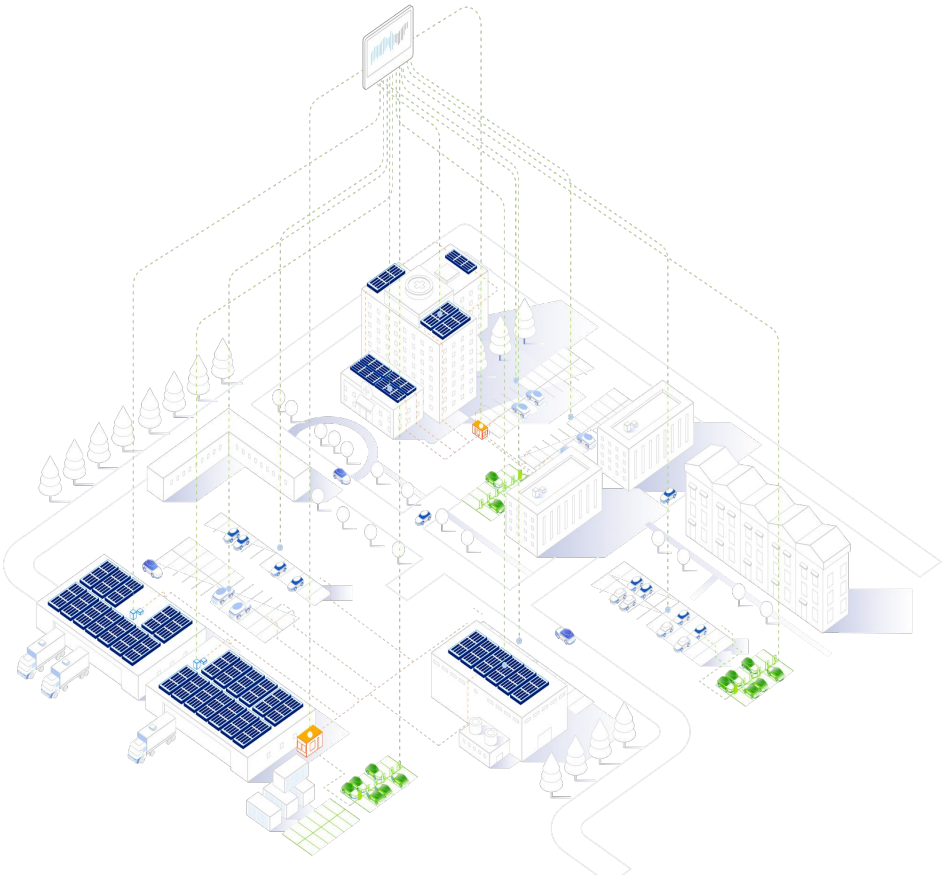
Charger/CMS Compatibility

Deploying a charge management system (CMS), like **ChargePilot® by PowerFlex**, is the best way to ensure reliable and cost-effective fleet charging operations, particularly at sites where the total capacity of the chargers exceeds the electrical panel and/or grid connection capacity. One of the key requirements to consider is whether your chargers use Open Charge Point Protocol (OCPP) version 1.6J or later. This is the widely adopted communication standard that CMS software uses to communicate with and control charging stations. Another requirement to look for is whether the chargers have a means for connecting to a charge management software.

This can be done via Wi-Fi or cellular signals, but a wired connection via ethernet cable is significantly more reliable and requires charging stations to have an ethernet port on the unit itself. Most chargers on the market today meet these requirements, but they continue to be important foundational requirements to understand.

ChargePilot® by PowerFlex

A smart CMS can reduce project investment costs by making efficient use of existing utility service, and shrink long-term operational costs by optimizing charging schedules to your utility rates. **Learn more.**



Physical Considerations

A transition to electric vehicles will impact fleet operations in many ways, but one of the biggest changes is the equipment required to fuel vehicles will now be co-located alongside the vehicles, which requires careful planning to ensure the physical layout can support efficient fleet operations.

All charging stations on the market have slightly different configurations, features, and accessories that can impact the way that they fit into a charging depot and ease of use day to day. Understanding the variety of options on the market can make effective use of space, and even build in some degree of flexibility in terms of charging and fleet operations.

Multi-port Chargers

Many charging stations, including both AC and DC models, have multiple charging ports so they can serve more than one vehicle and more than one parking stall. Multi-port chargers can be more cost-effective in terms of dollars per charging port, and they can also be a way to maximize physical space. One common configuration is to install dual-port chargers that have two charging cables coming from each charging station. Another configuration, more common in higher-powered DC chargers, is to have a charger with one central power cabinet located a distance away from parking stalls, that then supplies power to two, three, or even more charging ports.

One critical feature to understand about multi-port chargers is the distinction between sequential and simultaneous charging. Sequential charging means that a charger can only deliver power to one charge port at a time. This means that even though multiple vehicles can be connected at the same time, they will need to take turns charging. Depending on the internal logic of the charger, the order in which vehicles charge is sometimes based on the order that they plugged in. The right CMS may be able to overrule the charger's sequential logic, but this varies. The alternative to sequential charging is simultaneous charging, whereby a multi-port charger can deliver different amounts of power to each charging port at the same time. Most chargers can simply divide the total power evenly across all charge ports in use, but a charge management system can dispatch the available power in other increments based on a fleet's operational needs.

Charger Configurations and Optional Accessories

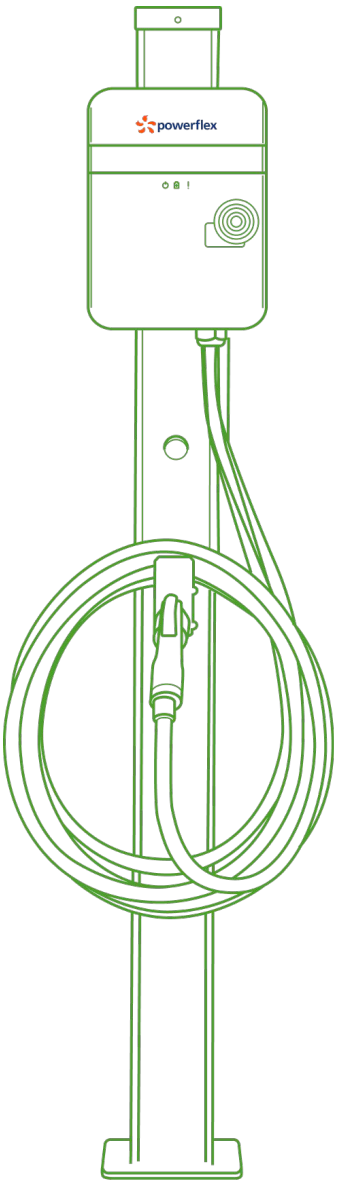
Understanding the various configurations and accessories available with different chargers can also help plan for hardware selection, site design, and operational efficiency. Many chargers that are well suited for commercial fleets can be mounted on the wall and/or on pedestals.

Depending on the physical layout of a fleet depot, different options for mounting chargers can help maximize space and add flexibility to the fleet's charging operations. Another set of considerations and features that varies across brands and charger type is the length of the charging cable. In general, the maximum length for any EV charger cable is about 25 feet. A longer charging cable can add flexibility and versatility, especially as the location of the charge ports on vehicles varies across OEMs. On the other hand, longer cables can be more cumbersome to handle. The importance of good cable management cannot be overstated, as cables require a level of care and attention to ensure they stay in working order.

Many chargers have optional cable management systems such as cable retractors or holsters to safely stow the chargers when not in use, and to keep cables and the plugs off the ground. The added cost of these accessories is often well worth the investment to avoid excessive wear and tear on charging equipment that can lead to charging errors, damaged equipment, and reduced charger uptime.

Bidirectional/ V2G Chargers

Commercial fleets across the country continue to wonder if they should invest now in V2G-capable chargers as they begin adding electric vehicles to their fleets.



Connecting electric vehicles to the grid and monetizing their batteries is precisely the goal that PowerFlex is working towards. At the same time, there is a misconception that any fleet in the country could simply purchase bidirectional chargers today and sell energy back to the grid tomorrow. The reality is that while these technologies exist today — and are rapidly improving and being deployed — many electric utilities aren't ready to offer programs that provide payment for electricity exported to the grid from vehicles to all customers. Before investing in Vehicle-to-Grid (V2G) chargers, fleet owners should consult their local utility to determine if they offer programs that will allow them to earn enough money through participation to justify the higher equipment costs. PowerFlex also offers Vehicle-Grid Integration assessments that provide an overview of V2G options for a fleet given its location, and model potential revenues. If V2G programs aren't available, another way to capture value and leverage vehicle batteries in the near term would involve using unidirectional chargers, a CMS like ChargePilot® by PowerFlex, and participating in some of the existing utility programs for managed charging and demand response. By smart charging with an advanced CMS, you are setting yourself up to be ready for V2G as soon as it becomes commercially available.

Examples

Commonly recommended smart charger models for Light- and Medium-Duty Fleets

AC Chargers (11.5kW - 19.2 kW)

- Simple, low-cost chargers (can be under $2,000 for single port)
- Flexible pedestal options for mounting two chargers side-by-side or back-to-back depending on site layout

DC Wallbox (20-25 kW)

- Low-power DC, which is great for vehicles that only take DC chargers
- Often offered in two models with different voltage input depending on existing site power (240V or 480V input)

30-50 kW Dual Port DC (wall-mounted or pedestal)

- Dual-port configuration means saving physical space and flexibility (e.g., 20 kW on two ports, or up to 40 kW on one if needed)
- Often have wall-mount or pedestal options

Multi-port DCFC

- Up to three high-powered ports with flexible physical configuration using power cabinet/ dispensers
- Also see mobile DC for garages or temporary solutions

Selecting the right charging solution for commercial fleets is paramount for ensuring smooth operations and maximizing benefits.

PowerFlex can help.

Talk to an Expert Today →

powerflex

About PowerFlex

PowerFlex is a clean technology solutions company making the transformation to carbon-free electrification and transportation possible. Our intelligent energy management platform PowerFlex X™ monitors, controls, and co-optimizes onsite assets like EV chargers, solar, energy storage, and microgrids — reducing overall energy costs through patented algorithms that maximize distributed energy resources.

PowerFlex is the largest installer of commercial solar in the United States, with over 500 megawatts (MW) of total solar capacity plus 50+ megawatt-hours (MWh) of battery energy storage. PowerFlex also manages more than 70,000 EV chargers nationwide, making it the largest hardware-agnostic EV charging provider in the U.S.

Through intelligent charging management and bidirectional vehicle-grid integration technology, PowerFlex enables electric vehicles to serve as flexible energy resources for transit agencies, school districts, and fleet operators.

PowerFlex is backed by EDF power solutions North America, Manulife Investments, and The Mobility House.

Visit **powerflex.com** for more information and connect with us on **LinkedIn** and **YouTube**.

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