Transform your fleet

greenlots
A Member of the Shell Group

Your complete guide to EV adoption

www.greenlots.com

Chapter 1

The Future is Electric

Whether you're acting on new company goals, focused on reducing environmental impact or trying to get ahead of looming government regulation , transforming a fleet to include EVs can be challenging. However, there are clear social and economic benefits of electrifying your fleet.

This guide was created to discuss important questions worth considering before beginning the fleet electrifiation process. This guide will thoroughly walk you through each step with numbers and graphs to help support your decision-making. Our goal is to help you optimize your fleet.

Most importantly, we will help you look into the future to ensure you are not stuck with costly and inflexible decisions. And remember, transforming your fleet can be done in stages or as a test pilot.

Prepare to dip toe-in-water....or dive right in. This guide will help you find the right solutions.

Regulatory Commitments Around the World

As of Dec 2018, 17 cities and countries around the world have publicly declared bans on internal combustion engine vehicles. See below for details.

Ban Gas | Ban Diesel | AV All Vehicles | NV New Vehicles

2018

China: Ban Gas, Ban Diesel
533 specific models

2024

Rome: Ban Diesel, AV

2025

Norway: Ban Gas, Ban Diesel, NV
Athens: Ban Diesel, AV
Madrid: Ban Diesel, AV
Mexico City: Ban Diesel, AV
Paris: Ban Diesel, AV

2030

Germany: Ban Gas, Ban Diesel, NV
India: Ban Gas, Ban Diesel, NV
Ireland: Ban Gas, Ban Diesel, NV
Israel: Ban Gas, Ban Diesel, NV
Netherlands: Ban Gas, Ban Diesel, NV
Brussels: Ban Diesel, AV

2032

Scotland: Ban Gas, Ban Diesel, NV

2040

United Kingdom: Ban Gas, Ban Diesel, NV
France: Ban Gas, Ban Diesel, NV
Taiwan: Ban Gas, Ban Diesel, NV

Automakers' Commitments

Over $90 BILLION of EV investments have been announced by automakers. By 2021, we'll see over 300 different EV models. [1]

2021

Toyota-Mazda:
10 EV models
$1.6B investments

Volvo:
Offer **electric options** for every model

2022

Renault-Nissan-Mitsubishi:
12 ZEV models
$1B investments

Ford:
20 ZEV models
$4.5B investments

Daimler Mencedez Benz:
Offers **electric options** for every model
$11B investments

2023

GM:
20 ZEV models

2030

VW:
$84B investments

Major Commitments by Global Leaders

Unilever — Commits to an **100% electric vehicle fleet** by 2030

IKEA — Plans for **electric vehicle home delivery** in five major cities by 2020.

amazon — Added **100 electric vans** to its delivery fleet in 2019

Deutsche Post — Designed and built its **own electric delivery vans**.

ups — **1/4** of UPS vehicles purchased by 2020 will use **alternative fuel** or advanced technology.

1/4 of its electricity will come from **renewable energy** sources by 2025.

Deutsche Post DHL Group — Operates the largest electric fleet in Germany.

Plans to **replace its entire mail and parcel delivery fleet** in the mid-term with electric vehicles

METRO — Wants to **reduce at least 50% of CO2 emissions** per square metre of retail space compared to 2011

verizon — **Replaced 234 gas-powered vans** in its New York City fleet with new vans.

US Commitments to Electrification

Seattle

2011:
300 charging stations installed

2030:
Fossil fuel-free fleet

Columbus, Ohio

300 EVs in the city fleets

2018:
93 EVs purchased

2019:
32 EVs purchased

California

2018:
$768M in utility programs approved

Electrify America Charging Routes

To do good for business and to meet environmental mandates, utilities often provide incentives to their customers to build charging infrastructure.

Nationwide Infrastructure Electrification:

1. **As of 2018, $10B+,** has been approved in utility customer programs
2. **By 2027, $2B** will be invested by Electrify America starting with a high power EV charging network

Chapter 2

Benefits of electrifying your fleet

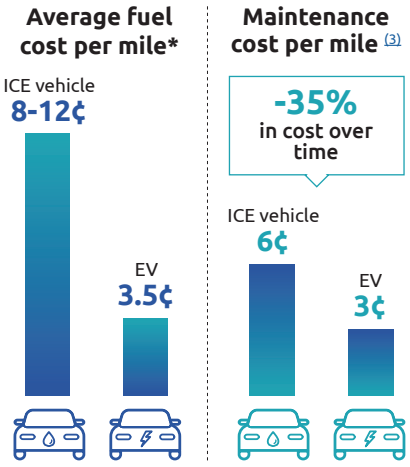
Significant reduction in total cost of ownership:

A study by UPS & GreenBiz Group found that **operating lifetime cost savings** was the second biggest advantage to going electric (just behind meeting sustainability goals.)" [2]

A study in British Columbia found that across a 120 car fleet, the cost savings over a 7 year service period were **almost $2 million** ($15,968/vehicle). [1]

EV prices are going down. Battery cost – one of the major price factors for EV adoption – have decreased by a factor of four since 2008. Bloomberg New Energy Finance (BNEF) has predicted that unsubsidized total cost of ownership for battery electric vehicles will be less than internal combustion engine vehicles by 2024.

Reduced maintenance is a considerable difference between an ICE and an EV due to significantly fewer moving parts, resulting in reduced cost and downtime. "Studies have shown that this represents a 35 percent decrease in cost over time. Some calculations peg this to about 3 or 4 cents per mile of maintenance cost in an EV versus closer to 6 cents in an internal combustion car."



* EV costs calculated using an efficiency of 29kWh/100 miles and a national average for electricity prices of $0.12 per kilowatt hour. ICE vehicle costs calculated with an EPA estimated 31 MPG combined city/highway at costs of $2.50 to $3.90/gallon [4]

Increased driver productivity:

Range anxiety is no longer an issue. An MIT study found that nearly 90% of vehicles on the road in the US could be replaced by EVs immediately without any loss of convenience in driving range.[1]

And did we mention the coveted HOV Lane? Most lanes allow EVs to cruise past traffic with a solo occupant.

ICE = Internal Combustion Engine

EV = Electric Vehicle
(A BEV, Battery Electric Vehicle means it is all-electric, not a hybrid)

Major incentive programs across America:

Are there financial incentives to support fleet electrification? Yes. Utilities & governments are investing **billions of dollars to help you electrify**. Some programs require no fleet operator investment at all, while others will provide funding at a small cost. Although the transition to fleet electrification is never fully 'free', one thing is for certain - these programs are limited and will benefit the early adopter.

Your charging provider will be the best resource to identify the mix of programs unique to your area.

Find your perfect mix:

1. Utility programs
2. State-funded programs
3. Tax reductions and exemptions
4. Bonus payments and premiums

...for both electric vehicles and chargers

Being ahead of government policies compliance:

While few legally binding policies have been enacted, numerous countries and cities around the world have promised to ban internal combustion engine vehicles in the near future. Currently, most electrifying fleets are focused on company goals. While California is typically ahead of the game in terms of regulation and incentives, other states are sure to follow, which is why automakers are rapidly changing their products before they run out of time. [5]

Your budget is not at the mercy of gas prices:

A recent report by Wheels.com[6] states that we spend **33% of fleet expenses on fuel.**

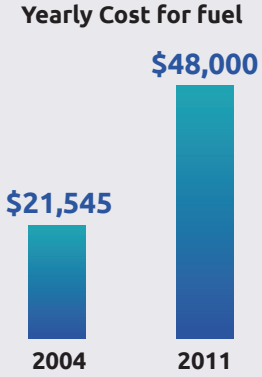
Let's run the numbers to see how it may affect a small fleet.

According to Statista.com[7], the **average price for a gallon of gas in 2004 was $1.58**. By 2011, assuming a 7 year service period for a fleet vehicle, the cost of a gallon of gas was $3.52, and held at that price for 4 years. While it's hard to give an average miles per gallon (mpg) due to the variety of cars and ages, let's posit a few numbers:

With a
20 car fleet

Getting
22 mpg

Driving
15,000 miles/ vehicle
each year



Unexpected, Uncontrollable Fuel Increase:
$26,455

Can you think of any other place in your business where 1/3 of your costs are extremely volatile?

The above statistics mean your budgets may need to more than double unexpectedly. On the other hand, electricity prices are highly regulated and predictable. You are even told when they will be higher and lower in advance, so you can plan for that and charge when it's cheapest.

Not sure what programs can support your fleet electrification? Greenlots can help you analyze existing initiatives and incentives that can benefit you the most.

It feels good to help the environment:

Not only do employees enjoy driving EVs (they say once you drive one, you never go back), employees report **being proud** of their company's efforts towards helping the environment.

Knowing that the air you, your family, and your team are breathing is better due to some hard work your company made to electrify your fleet beats any other monetary award.

But, you may not be convinced that it IS better for the environment. Some claim that you're just trading exhaust pipes for coal-burning utility smoke stacks.

Let's take a look.

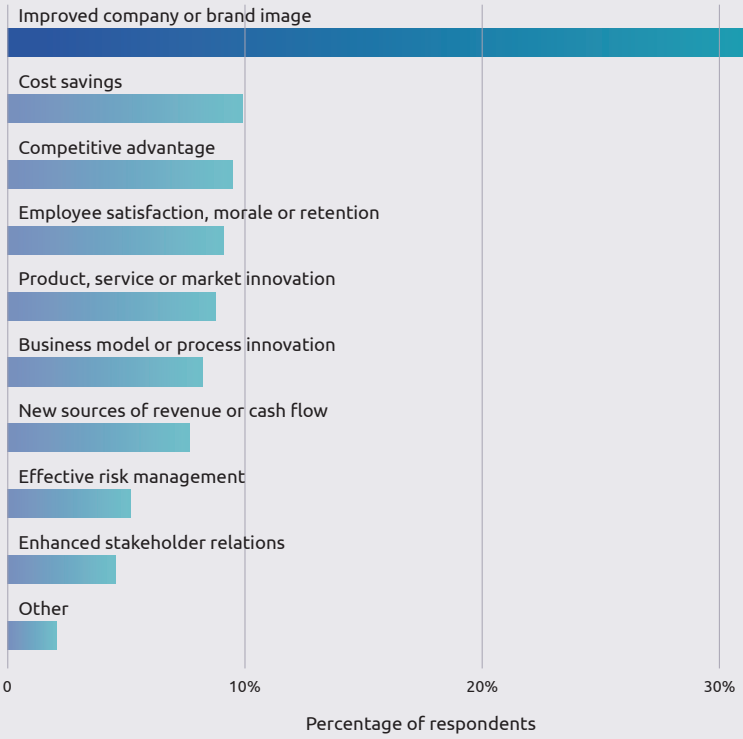
The Union of Concerned Scientists spent two full years researching this issue and found that even when considering manufacturing of both the car and battery, plus driving, emissions from EVs are half that of gas-powered cars.

Even in the dirtiest utility states such as West Virginia who gets 95.7% of its electricity from coal, EVs are the better choice.

Brand alignment and marketing rewards:

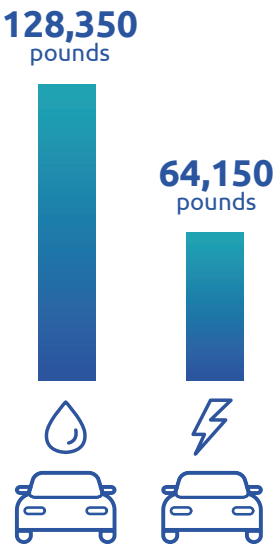
Helping the environment feels good. Yes, doing the right thing always feels great, but charging infrastructure also brings in good business. A UC Davis study showed that 43% of all respondents shopped at a retail establishment because of the EV charging at the location, spending an average of $30.

What are the greatest benefits to your organization?



MIT Sloan Management Review article [6]

Half the carbon emissions



10 year life-span combining manufacturing & daily use emissions from a car in a state that gets all of it's electricity from coal.

Chapter 3

Planning for your Electric Fleet

It's important to have an eyes-wide-open approach on such a big journey, and we want to ensure an honest look at what's ahead.

Even if you do everything right, here are a few obstacles you may be facing:

To keep your **upfront costs down**, it is critical to ask tough questions, crunch data points of your current fleet, and find the right EV charging hardware and software provider. Searching out that data can be complex and not always readily available.

Make it easier: *Create an internal cross-functional task force to oversee procurement, fleet operations, maintenance, engineering, facilities. Include senior leadership, sustainability and finance.*

Not everyone is excited about change. Whether it's you or your team, you could face roadblocks or hesitations that create major delays.

Make it easier: *Any large change requires conversations rather than mandates, with a range of constituents from the drivers to the CEO. Think of a time your company has made other large changes - what went well and what didn't? Talk to the people who managed the change for their suggestions.*

Timelines (due to fleet lease-end) may make decision-making crunched and uncomfortable, especially if there are engineering and construction delays on charger installation.

Make it easier: *This is where your charging provider is critical. Ask your charging provider for references and use them to gauge ease of installation. You want to hear specifics, like this: "I was quite impressed with installation. I was on vacation for the 2 week installation, and I came back and it was complete. I didn't need to be a project management middleman, there were no headaches." – Erin Bump, Property Manager, CBRE about her Greenlots installation.*

The greatest barrier to electrification is the **upfront costs,** according to 55% of survey participants (2). Depending on your fleet size, the decision to lease, get a loan, or pull directly from the coffers can make it hard to prioritize.

Make it easier: *Another critical aspect of your charging provider is tapping their knowledge of applicable money-saving programs and incentives. Between incentive programs and the myriad of cost saving calculators online, make sure to keep your team focused on the long-term investment potential.*

Until autonomous vehicles are a reality, **moving vehicles that are fully charged**, or charged enough for their particular job, can be complex and come with added labor. Furthermore, you don't want to overload your electrical system during peak hours.

Make it easier: *Smart charging is paramount for any fleet. Find a robust software that allows one person to manage multiple stations at multiple locations automatically, or from a simple click-of-the-button, online dashboard.*

Downtime during installation can entail coordinating electricity outages with other tenants and loosing parking during retrofits and installation. Fortunately, this process is typically completed in the matter of hours or a day.

Make it easier: *A good charging provider will give you accurate expectations of downtime so you can plan accordingly.*

Be aware – you may purchase tens of thousands of dollars of charging equipment, only to a few years down the road that you are **locked in to that manufacturer or software** provider when they don't play well with others.

Make it easier: *Specifically ask your charging provider if their software and chargers work with other manufacturers and vehicles, and importantly, how many. If your software only works with 3 charging station manufacturers, your future options are limited.*

While toe-dipping is a safer way to make informed and flexible decisions, you **may miss out on bulk-buy deals** from which the head-firsters will benefit.

Make it easier: *There are benefits on both sides. Find what works for you, and confidently proceed.*

Barriers to fleet electrification

"Curve Ahead: The Future of Fleet Electrification"

Chapter 4

The how-to guide

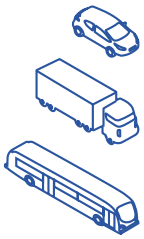
This guide will ask you questions to help you ponder, peruse, and prioritize the most important information.

Step 1

Gather Quantifiable data

You may be able to answer some of these off the top-of-your-head, but many will require some digging.

What is your fleet type?



- ☐ Light duty (ie: passenger vehicles used for sales people or administrative type jobs)
- ☐ Medium duty (ie: smaller trucks used for short deliveries/urban core)
- ☐ Heavy Duty (ie: long-haul trucks (or buses), class 7 & 8)

Distances typically travelled per week:

- ☐ 50 mi
- ☐ 100 mi
- ☐ 200 mi
- ☐ 300 mi

What time of day will they typically be out (are they all out at the same time?)

_____

Is a brand new vehicle necessary? Do you need to replace it at all?

- ☐ Yes
- ☐ No

Based on use case, does it make sense to go electric for all vehicles in the fleet, or just some with the current technology? If so, how many?

_____

Too many questions? Not enough answers?

Your Greenlots representative will help you answer all of these questions and provide turnkey EV charging solution. Our service starts before a charger even gets in the ground and flows all the way through to our 24/7 North American customer service and maintenance.

This is a great moment to justify every mile, and see if it's worth the cost.

Owning gives you more flexibility to buy used vehicles (great for the changing technology) and to choose your timing.

Why does the employee need a vehicle in the first place? Do you actually need all of the cars you have, would an EV car-share service work better?

Will you electrify your fleet in multiple phases?

Do you have a deadline (like lease expiration), that allows you to take advantage of bulk buy deals?

What are your current costs (maintenance, fuel, car cost, employee downtime productivity)?

Medium & light duty vehicles that travel a stable route/region for 50-100 miles are often considered the first to transition to electric due to cost savings and ease of charging.

If you have this information broken out by vehicle, great. If not, total cost averaged across the fleet is fine.

Step 2

Assess the team and company culture

Now let's take a look at your team and company culture. These are the big picture questions that are less quantifiable, but just as important in gaining buy-in to move forward. Think of some other large changes at your company.

What could have been done more effectively to make that large change easier and more efficient? What was done well? Talk to the people involved in the process.

Is fear or excitement the predominant emotion around electrification?

How can you turn fear into excitement? (ex. Ride and drive events?)

Creating mandates or surprising employees with what they may consider a large change is a sure way to hit roadblocks. Instead: start discussions, include their input, and make them feel heard. You will likely gain some valuable insight in your decision-making.

"Employee apprehension tends to melt away when they drive an EV. As soon as they drive one, the conversation is over."
- Geoff Tipene, Managing Director for SG Fleet New Zealand

Step 3

Research vehicle types

Surprisingly, this is the easy part. There are an infinite number of guides, calculators, and video testimonials online to help you with your decision, not to mention the fleet sales person. Here are the basic questions:

Leasing? How long of a lease? How many?

A 4-year lease will limit your ability to act on the data you are gathering.

Range?

Cost?

Vehicle purpose/use?

☐ Tool of trade

☐ Pool vehicle

Maintenance - how/where will you maintain vehicles?

Vehicle Management - would you like access to vehicle data such as state-of-charge, mileage, etc.?

Refer to your data above. To right-size your fleet, buy only the battery power you need to reliably take care of the work and return to the charging station for over-night charging (or determine mapping that will comfortably allow your employees to take a needed break).

Vehicle data is typically proprietary and may not be available to the fleet owner as easily as it is to a consumer. Feel free to ask vehicle manufacturers if they support fleet applications. Greenlots can also help.

☑ Step 4

Choose your charging infrastructure

"Vehicle selection is the fun part, but sorting out charging infrastructure is where procurement managers really earn their keep."[7] Charging infrastructure, which goes beyond the shiny, charging station, also includes electric panels, wiring, transformers, and of course the managing software.

If you don't do it right, you can easily spend too much on upfront costs (like paying the rental company upfront for gas when renting a car). To "do it right" means looking at all of the data you have gathered to determine retrofits or load management (charging cars at different times of day, or on a smart charger to reduce costs during peak utility hours) that will cut costs.

Your charging infrastructure provider will be a valuable resource here. Lean on them and their recommended electric engineers and installers for creative solutions.

Also, while buying and selling-off your vehicles is relatively easy, ripping out charging hardware or transferring data to new software can be costly and frustrating. Ask the right questions early to ensure you have an open system that does not lock you in and allows all parts (even those you haven't bought or thought of yet) to play nicely together now, and in the future.

Your options are about to explode.

In addition to the incredible automaker commitments (see p 3), we'd like to introduce a few EV start-ups: Arrival, Workhorse, Chanje, Thor Trucks, TransPower and Hyliion, and Proterra and BYD (bus manufacturers)

Things to consider: On-the-go charging forces drivers to take a break, reducing risks associated with driver fatigue.

There are two parts to EV charging infrastructure:

Charging hardware (the station & parts that deliver power, including electric panels, copper wiring, and transformers)

Charging software (what makes a charging station "smart" – a real-time, online dashboard that allows you to control charging stations and sessions, manage the load of the chargers, set up prices, request maintenance, and get reports on key metrics such as energy use, fuel savings, and greenhouse gas emissions avoided)

Charger & Vehicle Agnostic?: Your EV fleet is most likely to expand over the years...

Now or in the future, you may get chargers from different companies for different needs. You need them to seamlessly talk to each other and relay valuable tracking data to you. For example, Greenlots offers you a choice of more than 10 different charging station manufacturers. Our software connects them on one online dashboard for easy management.

Does the charger you choose connect to all vehicle types?

- ☐ Yes
- ☐ No

Does the charger you choose play well with other chargers or would you need to replace the chargers if they go out of business?

- ☐ Yes
- ☐ No

Managing Load: this means using a 'smart' charger and software to automatically charge cars during times that avoid peak utility demand rates (keeping costs low), or work within the electric capacity your building can deliver at any given point (reducing costly retrofits upfront).

For ex. BYD trucks & Tesla provide their own chargers as a value add...but that charger only works with their brand.

Some charging software, like Greenlots, provides data that can be used at public charging stations to track back to your master dashboard. This helps operators optimize their fleet network by knowing the available range a vehicle has to complete its work, reducing downtime.

Step 5

Assess and repeat

After your fleet has been electrified, it is time to take the results assessment and establish new fleet electrification goals. To fulfill them, it is good to repeat all these steps.

Key features to look for in your charging software:

1. Open standards (charger & vehicle agnostic)
2. Integration with vehicle telematics
3. Load Management
4. Applicability to any fleet types
5. Roaming
6. 24/7 customer support
7. Variety of hardware choices

An overview of key questions for an EV charging infrastructure set up

While our document provides you complete and thorough steps to ensure you don't miss essential details while planning and implementing your fleet electrification, these key questions give you an overview of important points to help you take your first steps towards fleet electrification

EV charging infrastructure:	Are you looking for on site or on-the-go charging?	How many sites do you have?	Are you planning to have your own chargers on the route or use public chargers?
Electric fleet:	How many EVs are you planning to have in 1-3 years? In 3-5 years? In 5-10 years?	Will all the vehicles be charged on site or will some cars be charged by employees at home?	If charged at home, who pays for the charger installation? Who pays for the charging bill?
Building and load:	Is your building capable of supplying the power you need?	Do you lease or own your building / buildings?	Have you talked to the landlord about who will pay for the EV charging infrastructure?
EV chargers:	How many on site chargers do you need to make sure all the vehicles are charged on time and ready to go?	Does the charger you choose connect to all vehicle types?	When charging is finished, is the station down until the car is moved?
EV chargers' maintenance:	What happens when your charger stops working?	Who provides maintenance support?	How much does maintenance cost?
	Can you call customer support anytime, day or night, to get a North American based representative?		
EV charging software:	Does the charging software you choose play well with other charger stations?	What speed of chargers do you need? Do you need a full charge or is 80% enough to fulfill the travel distance needed?	Does your charging software talk to vehicle telematics, showing the vehicle's state of charge at any time and location?

Chapter 5

Next steps... Are you ready?

Congratulations on hanging on until the end! From the questions provided in this guide, you are now ready to make some important decisions that will reduce costs, engage employees and make a meaningful impact on our environment.

Whether you answered all of the questions, or perused to see what you're getting into, the next step is to call a charging infrastructure provider for a site assessment. Having your answers prepared will get you farther faster, but a good provider should be asking all of these questions, to help you get the best solution.

Why choose Greenlots?

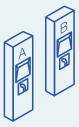
The Greenlots team and software solution will help you reduce total cost of ownership and the upfront costs. One of our core values is to make this process as easy as possible, and to help you make decisions you will be happy with in the long-term.

We provide a robust software solution to take you from start to finish with our turnkey EV charging solution, including site assessment, hardware selection and more. We provide America's largest selection of hardware partners, giving you the widest variety of choice.

Here are the main features that Greenlots provides for Fleet Solutions:

Charging infrastructure deployment

We are eager to help you with your site assessment and permitting, engineering and system design, installation, and commissioning, as well as finding discounts and incentives that will support your EV charging infrastructure and decrease the upfront costs.



Wide selection of hardware

Our network is hardware agnostic giving you the choice to select the best mix of hardware that meets the needs of your sites and use cases. We certify hardware and software performance to ensure reliability.

Cloud-based control

We provide real-time control dashboards that allow you to view and manage charging sessions, track energy consumption via a vehicle, fleet, or sub-fleets, and break down costs for any group of vehicles, as well as view insights from EV charging predictive analytics.

Smart Charging Optimization

Our smart charging energy management solutions allow you to manage the EV load to operate within the current power capacity your building, while avoiding high energy costs. Automatically adjust the speed of charging based on your energy requirements and priority of vehicles based on range and schedule needs.

Charging & Telematics Data Integration

Our software helps you get the most out of your EVs and chargers by enabling the scheduling of vehicles based on priority as well as assignment and queuing of vehicles for specific chargers.

24/7 charging support

We provide 24/7, North America based phone support for our customers.

To find out how Greenlots can help you build the most efficient infrastructure for your electric fleet:

+1-888 751 8560
info@greenlots.com

Why Greenlots?

Long history:	Greenlots has 10+ years of history working with site owners in over 3 continents and 13 countries, providing EV charging infrastructure at scale.
Extensive expertise:	With thousands of chargers in our network, and +2500 more contracted and coming soon, we are one of the nation's trusted EV charging infrastructure provider.
Trusted:	Greenlots recently became a wholly owned subsidiary of Shell New Energies US LLC, a subsidiary of Royal Dutch Shell plc. With this deal, Greenlots' technology and team have become the foundation for Shell's electric mobility solutions in North America. Together, the companies will offer best in class software and services that enable large-scale deployment of smart charging infrastructure and integrate efficiently with advanced energy resources like solar, wind and power storage.

Sources

(1) https://www.theclimategroup.org/project/ev100

(2) "Curve Ahead: The Future of Fleet Electrification," https://sustainability.ups.com/media/UPS_GreenBiz_Whitepaper_v2.pdf

(3) https://www.plugincars.com/eight-factors-determining-total-cost-ownership-electric-car-127528.html

(4) https://www.electrificationcoalition.org/wp-content/uploads/2018/06/ElectricVehicleProcurementBestPracticesGuide.pdf

(5) https://www.government-fleet.com/304788/public-fleets-in-9-states-may-get-more-zev-funding

(6) http://image-src.bcg.com/Images/MIT_Sustainability_tcm9-125057.pdf

(7) https://driveelectric.org.nz/whitepaper/building-an-electric-fleet-a-how-to-guide-for-businesses-considering-transitioning-to-electric-vehicles/

greenlots
A Member of the Shell Group

Greenlots, a wholly-owned subsidiary of Shell New Energies, is powering the future of electric transportation with industry-leading software and services that equip drivers, site hosts and network operators to efficiently deploy, manage, and leverage EV charging infrastructure at scale.

www.greenlots.com