

Prepared by Randall Reilly for

# NIKOLA



A ROADMAP FOR SETTING UP YOUR BATTERY ELECTRIC VEHICLE CHARGING INFRASTRUCTURE

# ELECTRIFY YOUR FLEET

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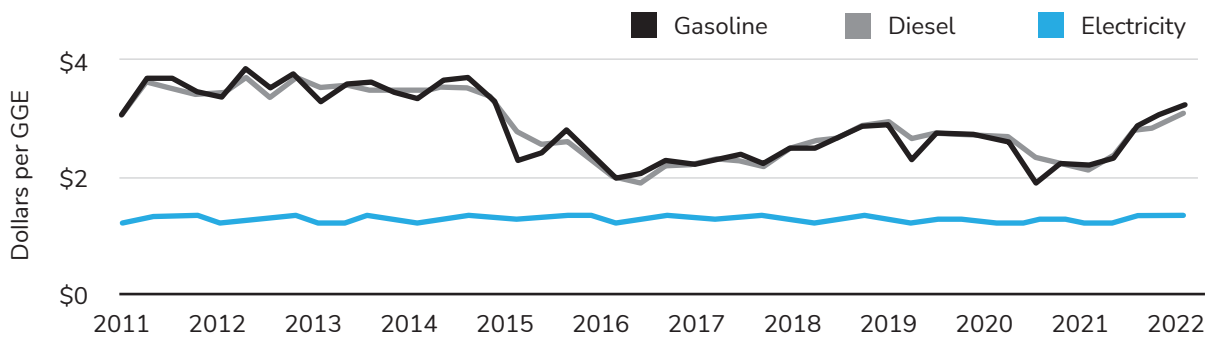
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**The transportation industry** is accelerating the transition from nonrenewable to renewable resources. Adding electric power to your fleet is one of the most significant ways to meet your sustainability goals and create a positive message for your city, clients and drivers.

Incentives may offset the cost of building electrical infrastructure. The federal Bipartisan Infrastructure Law provides vouchers and discounts for medium- and heavy-duty BEVs and the charging infrastructure they require, easing the initial financial burden of cutting greenhouse gas emissions.



*In the last 10 years, petroleum-based fuels have been subject to significant price volatility, while electricity prices have stayed stable and consistently lower than both gas and diesel. SOURCE: U.S. Department of Energy, Alternative Fuels Data Center*

Once a fleet decides to add BEVs to their operation, the next step is to create an efficient and economical charging ecosystem that works for their application. This can be daunting to those new to the process, as it requires navigating a complex electric grid system comprising more than 3,500 utilities in the U.S. The planning and permitting process can be time-intensive, and there is no one-size-fits-all solution.

### BEVs = Reduced Maintenance Costs

- The battery, motor, and associated electronics require little to no regular maintenance.
- There are fewer fluids, such as engine oil, that require regular maintenance.
- Brake wear is significantly reduced due to regenerative braking.
- There are far fewer moving parts relative to a conventional fuel engine.

*SOURCE: U.S. Department of Energy, Alternative Fuels Data Center*



David Breault has been working in e-mobility on both the charging solution side and currently as the business development manager for Massachusetts-based Alta eMobility, a dealership that specializes in helping to deploy battery-powered Nikola Tre trucks. Breault assists customers with the process of managing their EV charging solution. His background as a subject matter expert with ChargePoint, a network of electric vehicle charging stations, gives him the unique perspective of the benefits and processes involved in what can seem like a formidable endeavor. He's confident that with the right information and guidance, a fleet can install a charging solution infrastructure to power their BEVs.



*Mobile charging solutions such as Nikola's Mobile Charging Trailer offer flexibility for your charging needs. These portable charging stations are also ideal for vehicles that need a charge while away from their charging infrastructure or during emergencies such as blackouts and natural disasters.*

There's a lot to learn from fleets that already operate class 8 battery-electric trucks and the dealerships who support them, Breault says. While every utility is different and every fleet has unique requirements, there are basic best practices that he says come from lessons learned from early adopters.

This guide walks you through the essential steps for setting up your EV charging solutions. Use it as a roadmap to mastering both BEVs and using electricity as a power source, plus discover tips to smooth over the obstacles you might encounter.



## WHAT COMES FIRST?

It may seem like a “chicken or egg” scenario — do you coordinate with your utility or buy the truck first? Bruce Kurtt, Senior Vice President and Global Head, Sales and Commercial Operations for Nikola, manufacturer of the Tre BEV, says one doesn't come before the other. “Both the infrastructure and BEV production will need to happen in parallel. It's more of a partnership between the fleet and the utility,” Kurtt says. Because of this, the Nikola sales team works alongside customers to navigate the process from tapping into incentives to assisting with the initial utility contact.

Dave Schaller, the industry engagement director for North American Council for Freight Efficiency, says finding support from OEMs is key for fleets working to adopt BEVs. His position requires him to work closely with fleets, OEMs, suppliers and utilities along with the drivers and sponsors of NACFE's Run on Less, a program that documents real-world trucking demonstrations.

“Your truck OEM knows how to work with you, but the utility company may or may not behave the same way,” Schaller says. “Leverage your relationships with your OEM, dealer, charging company and software provider to work as a team as you jump through the hurdles. The sooner you start, the better.”



The exact timeline will vary, but for now, new BEV owners can expect the process to take a minimum of six months from the first sales meeting to charging a truck in your yard. Much of the timeline depends on your current power capabilities, how fast your utility can complete the upgrades and if there are any parts supply chain issues that arise. In high-demand areas like California, expect it to take up to a year.

Once you decide on size, quantity and OEM for your BEVs, the next conversation with your OEM salesperson should include realistic expectations for timing on aspects such as financing, truck delivery, charging station purchase/lease and setup, and electric utility coordination and partnership.



### QUICK CHECKLIST

*(details on following pages)*

- Start with your dealership *(pg. 7)*
- Make contact with your utility company *(pg. 8)*
- Choose your battery-electric vehicle(s) *(pg. 8)*
- Determine charging needs *(pg. 9)*
- Consider charging sizes *(pg. 9)*
- Assess financing and incentives *(pg. 10)*
- Procure charging hardware and software *(pg. 11)*
- Design the site plan *(pg. 12)*
- Ready to go *(pg. 13)*

## 1. START WITH YOUR DEALERSHIP

Your first visit should be with the dealership where you plan to purchase your new BEVs. However, before a truck order can be placed, your dealership needs to ensure you can have charging stations installed on your site.

“You can have electric charging stations on your site without an electric vehicle, but you can’t operate a vehicle without a charging station,” Breault says.

Because of this, dealerships who sell BEVs typically have support staff to assist with the charging solution process. Charging experts such as Breault will provide an initial site assessment to determine if your facility has 480V and enough capacity for the required DC fast chargers. Many fleets don’t know what their electric capacity is, Breault says. If that’s the case, you can work with a commercial electrician to determine if you have the required 480V and capacity. In addition, he says you can also review your utility bills for the past year to get a sense of what you will need for power. The team will look closely at your operation’s current electric usage and also evaluate the yard for ideal placement.



**TIP:** Choose a manufacturer that offers comprehensive support from truck to charge, including bridge solutions such as a mobile charging trailer.





## 2. MAKE CONTACT WITH YOUR UTILITY COMPANY

Coordination and collaboration with your power utility company begins with initial contact. While this may sound like an easy phone call, it may take time to find the right person to handle your request. If you're having challenges, dealership experts can often point you in the right direction due to their frequent contact with the utility companies. Your charging station sales associate will also be familiar with who to contact at local utilities.

Once in contact with the right person, you should receive a list of the information they need from you in order to proceed. For example, California's Pacific Gas & Electric (PG&E) suggests you come prepared with a demonstrated commitment of two or more EVs by end of 2024. They also ask for charger usage data for a minimum of five years, a long-term electrification growth plan and a schedule of projected load increase. You will also need to provide information on if you own or lease the property where the chargers will be installed. While every utility is different, this information is good to have for any size operation in any location.



**TIP:** The more details, the better. Compile extensive information about your desired BEVs and your own operations before the first meeting.

## 3. CHOOSE YOUR BATTERY ELECTRIC VEHICLE(S)

In addition to the more typical truck specs, BEVs require you to consider duty cycle, range, dwell time, battery capacity, charge port, dealer support and how the BEV fits into your fleet operation. Once you choose your BEVs for a pilot program, your next conversation should be about realistic expectations for timing around all the moving parts: financing, truck delivery, charging station purchase/lease and setup, and electric utility coordination and partnership.



*The Nikola Tre BEV has a range of more than up to 330 miles and can charge to 80% capacity in as little as 90 minutes.*

## 4. DETERMINE CHARGING NEEDS

While it's preferable to charge the trucks overnight when utility costs are low, there are solutions for operations that run multiple shifts.

Andrew Christian, head of BEV Energy Solutions for Nikola BEV Charging Solutions, says that to determine your charging needs, you must do a deep dive into your operation. If your trucks come back to the yard at night, you can use a slower charger and have them fully charged in the morning. But if you need them to run two shifts, then you may need a stronger, more expensive charger.

"Everyone wants increased range and decreased charge time, but often it's more expensive, and there may not be infrastructure capacity at the time," Christian says. If the utility needs to build a bigger transformer and create a more robust infrastructure before you can get started, you still have options to get on the road. This is where bridge solutions such as a temporary mobile charging unit or a diesel generator may come into play.

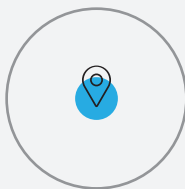
Your EV rate structure will consist of a subscription level based on charging needs, a time-of use pricing or combination of different levels including overage fees.



**TIP:** Leverage your relationship with your BEV manufacturer and charging solution hardware and software providers to find the charging options and times that work best for your business.

## 5. CONSIDER CHARGING SIZES

Fleets typically need 200 amps per truck. Due to its extended battery, the Nikola Tre BEV requires a DC fast charger. Depending on your operation, the dwell time and number of vehicles, Breault recommends 60 to 175kW chargers.



10% of HD trucks in the United States have a primary operating range of 500 miles or more, whereas **70% operate primarily within 100 miles.**

Source: Borlaug, B., Muratori, M., Gilleran, M. et al. Heavy-duty truck electrification and the impacts of depot charging on electricity distribution systems. Nat Energy

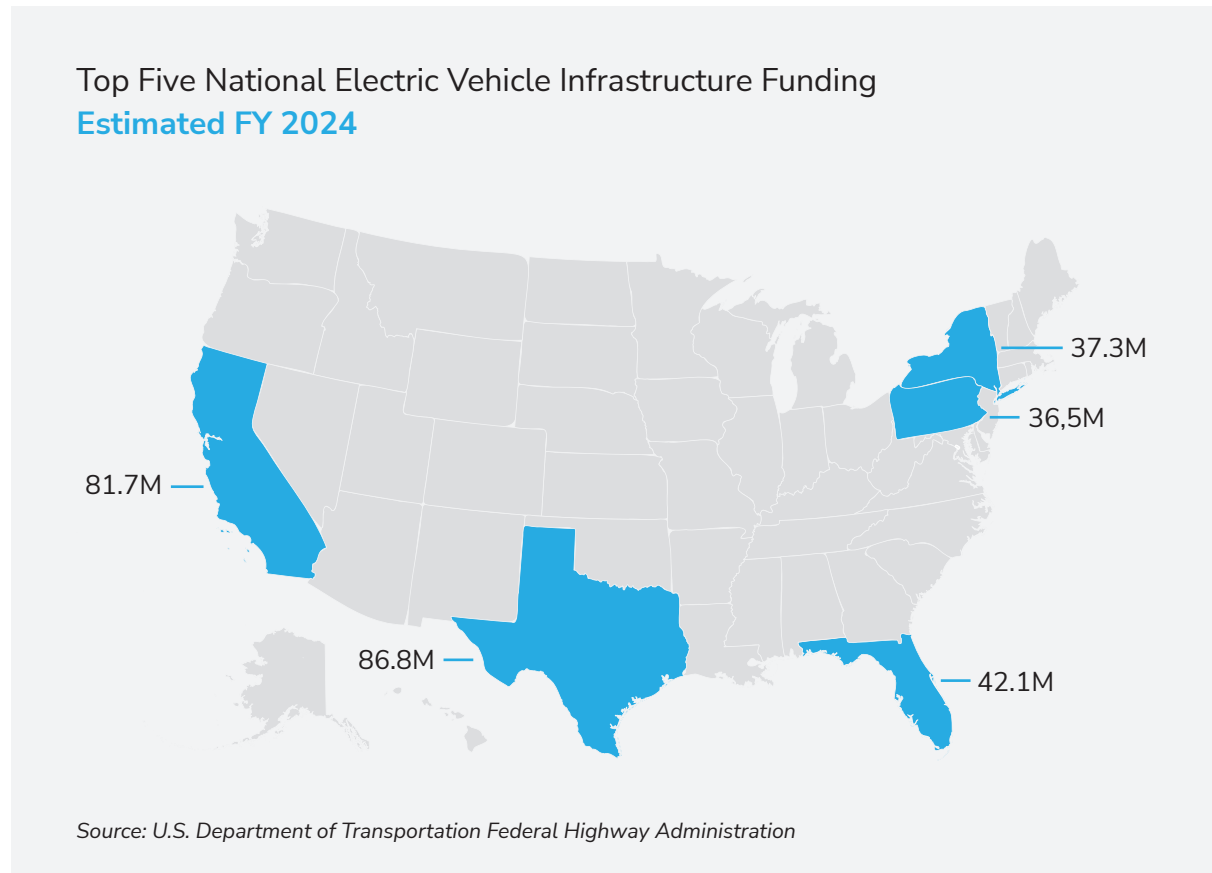
## 6. ASSESS FINANCING AND INCENTIVES

Your OEM dealer or salesperson will point you in the direction of available incentives along with lease or purchase financing. Breault says Alta eMobility and other Nikola dealerships can also bundle the cost of the chargers, including the infrastructure, into the cost of the eTractor and BEV.

Alta eMobility partners with businesses throughout the process and assists with securing several of the current federal and state-issued incentives and rebates for those decommissioning diesel trucks and implementing eTractors. Breault works with clients to locate available charging incentives as well as with local utilities to help reduce costs for his customers. Many charging incentives are rebate programs, with funds given after the installation is complete.

Incentives vary based on geography and zip codes. California and New York offer the most robust incentives. For example, a Nikola Tre BEV in California is eligible for up to \$150,000 per truck subject to HVIP requirements and up to \$185,000 per truck subject to NVTVIP requirements. More states will offer incentives as they become available.

\*See Bipartisan Infrastructure Law state-by-state funding for the next five years.





## 7. PROCURE CHARGING HARDWARE AND SOFTWARE

### Hardware solutions

You can purchase your plug-in charging stations outright or lease them from a growing marketplace that offers a variety of options. Most fleets choose to install charging stations in their yard, although some dealer networks offer charging options as well. Until there is a nationwide fast-charging network for commercial vehicles, buying or leasing your behind-the-fence charging station is the best way to go.

The installation time is faster if your facility already has 480V electrical capacity. Longer lead times occur when you don't have enough electric power or capacity and require new electrical services like installation of power lines from your local utility. If this occurs, Breault says Alta e-Mobility will coordinate the delivery of the Nikola Tre BEV and the charging equipment at the same time.

Nikola's Mobile Charging Trailer (MCT) can help speed up your access to EV operations in the case of longer lead times. The Nikola MCT is built on a 16-foot trailer platform and is versatile and flexible. While you are waiting for permanent charging infrastructure to be built, a simple-to-implement MCT can have you on the road to zero-emissions, lightning fast. This can also allow you to focus on how you want to operate and grow your EV fleet before you incur significant capital expense of permanent charging stations. Learning how you best operate your EVs within your business will help you to be smart about your permanent recharging infrastructure plan.

Even once permanent charging stations are in place, the MCT offers a mobile charging capability to support your EV operations at fleet depot locations or remote environments.

### Software options

"The key is the right power at the right time," Christian says. This is where software that optimizes peak timing efficiencies comes into play. Electrical loads are higher in the morning and evening, so your best charging time may be in the middle of the night.

Look for a program that manages loads, route optimization, time-of-day electricity rates and other smart charging efficiencies. The marketplace offers hardware and software packages, but you can also pick and choose your own combinations.



Trucks that operate within 100 miles of their homebase are responsible for **40% of nationwide energy consumption.**

Source: Borlaug, B., Muratori, M., Gilleran, M. et al. Heavy-duty truck electrification and the impacts of depot charging on electricity distribution systems. *Nat Energy*

## 8. DESIGN THE SITE PLAN

Every yard is different, and charger placement is based on the operation and physical design. For a pilot program that includes several electric vehicles, Breault says he likes to place the chargers on a fueling island for easy access for all vehicle types. But he also says you need to determine where the power will be in relation to where the trucks are usually parked, considering if the space requires unhooking the trailer and other constraints.

An electrical contractor designs charging system infrastructure behind the meter, which includes charging stations. This design may be done in partnership with the local utility company. For example, PG&E offers a capacity check where they estimate how much electric capacity you need. They then survey your site and provide initial design of your to-the-meter infrastructure build-out and give you a rough order of magnitude.



*A truck operator uses the Nikola Mobile Charging Trailer to charge his Nikola Tre BEV. Breault says that drivers quickly come around to electric trucks when they experience the quiet ride, easy steering and shifting-free driving experience for themselves.*

## 9. READY TO GO

Once permits are issued and the design is finalized, construction of charging infrastructure and any required upgrades by the utility can begin at your site. After the utility work is completed, it's time to charge up your new BEV and begin the journey into zero-emissions.

Training is crucial at this stage, and your dealer support should include both technician and driver training. Drivers particularly need to be trained on charging and driving with regenerative brakes. Breault says that even the most skeptical drivers are enthusiastic about the BEVs once they get behind the wheel.



*Dealer support should include driver training as part of your BEV purchase. Training drivers on charging procedures and driving with regenerative braking will both ease the transition and help fleets get the most out of their new BEVs.*

“Even the most hesitant drivers quickly come around and end up saying they prefer it over diesel trucks,” Breault says. He says they like the quiet, smooth ride, easy steering, no shifting and immediate acceleration along with the torque and power going uphill.

The dealership usually offers maintenance support and technician training. It's typically anticipated that BEVs will require less costly maintenance due to fewer and less complex parts and fewer fluids. Since they use regenerative braking rather than disc brakes they also seldom need replacement pads.

The charging stations need a regular maintenance program, and technicians should be trained to perform routine preventative maintenance on the chargers and connectors.

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For an interactive step by step checklist visit:

[afdc.energy.gov/files/pdfs/ev-fleets-checklist.pdf](https://afdc.energy.gov/files/pdfs/ev-fleets-checklist.pdf)



## CHECKLIST FOR PERMIT APPLICATIONS

Bring these items to your meeting with your utility company

- A paid vehicle invoice, approved vehicle grant, or a letter from the board/owner/city council
- A vehicle and electrification plan
- Description of location for charger placement (map)
- Information on your charger company, model and kW size
- Details on secured funding for out-of-pocket costs (such as grants or approved budget)
- Demonstrated leadership approval for EV fleet program participation

Source: PG&E application checklist

Larger scale heavy-duty BEV projects are already in the works. Many of the pioneering fleets will go from a handful of units to dozens or even hundreds in 2023, according to the State of Sustainable Fleets 2022 survey. Still, there's no getting around the challenge of relying on an aging grid system to power these new zero-emissions trucks.

However, there is good news on the horizon. The first round of funding for the Grid Reliance and Innovation Partnership Program, which totals \$10.5 billion, represents the largest single investment in critical transmission and distribution infrastructure. New and upgraded transmission lines will deliver electricity where needed and meet clean electricity goals by 2035.



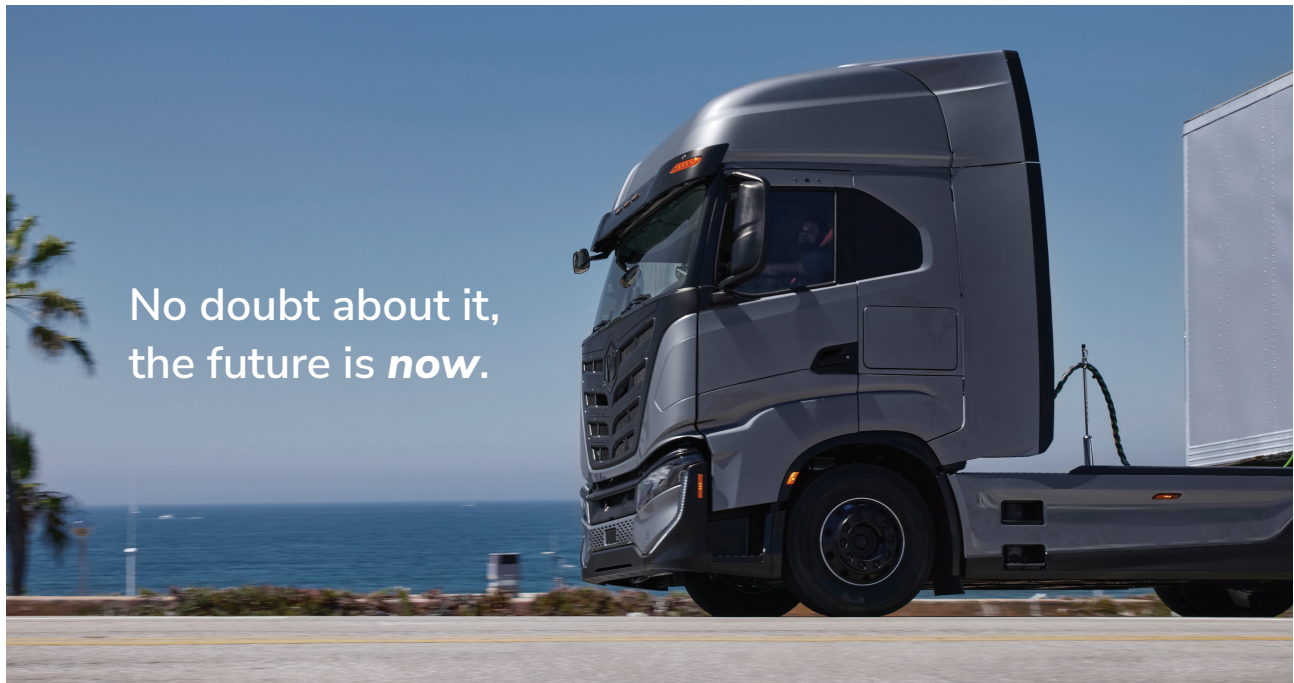
New and upgraded transmission lines will deliver electricity where needed and **meet clean electricity goals by 2035**

Meanwhile, new technology like BEVs will evolve over time. "Any new technology is going to take time before it experiences mass adoption," Christian says. He says developing an ecosystem solution for the customer is best accomplished in a phased manner, with a detailed assessment and timeline that may include adding a mobile charging solution to accelerate the process.

Any plan will require both legislation as seen in California and incentives for customers going through the electrification process.

“Trucking follows behind automotive by about five years, so it’s a long game,” Christian says. “As costs come down and incentives go up, there will be a total cost of ownership that electric trucks will win out over diesel.”

National Grid’s Electric Highways Study provides a glimpse into the future of the electric highway. Demand will come from not only passenger vehicles but also electric trucks and heavy-duty vehicles. The study predicts a future where electric trucks can charge at highway-accessible fast-charging locations. Developing the grid updates to make this happen could take years, and highway fast-charging sites will require tremendous amounts of electricity, comparable to what’s needed for a sports stadium or even a small town. By 2030, some sites will exceed delivery limits for the low-voltage distribution grid. Fortunately, many highways overlap with the high-voltage transmission system — which can be tapped to deliver the power that drivers will need.



No doubt about it,  
the future is *now*.

“If you are not already looking into a pilot program to transition your diesel fleet to electric vehicles, now is the time to call your dealership, Breault says. “Shippers, ports, municipalities, and customers with their own zero-emission goals continue to drive the demand for fleet electrification. If you are ready, most dealerships offering BEVs have a dedicated eMobility team to walk you through the process.”

“No doubt about it, the future is now,” Breault says.

Five-Year Bipartisan Infrastructure Law for Electric Vehicles by State

[fhwa.dot.gov/bipartisan-infrastructure-law/evs\\_5year\\_nevi\\_funding\\_by\\_state.cfm](https://www.fhwa.dot.gov/bipartisan-infrastructure-law/evs_5year_nevi_funding_by_state.cfm)

PG&E Detailed Timeline

[pge.com/pge\\_global/common/pdfs/solar-and-vehicles/clean-vehicles/ev-fleet-program/EVFleet\\_Guide\\_ElectrificationProcess.pdf](https://www.pge.com/pge_global/common/pdfs/solar-and-vehicles/clean-vehicles/ev-fleet-program/EVFleet_Guide_ElectrificationProcess.pdf)

PG&G Fuel Savings and Total Cost of Ownership

[fleets.pge.com/fuel-savings](https://fleets.pge.com/fuel-savings)

Mini Guide to BEV

[cdn.stateofsustainablefleets.com/2022/state-of-sustainable-fleets-2022-miniguide-bev.pdf](https://cdn.stateofsustainablefleets.com/2022/state-of-sustainable-fleets-2022-miniguide-bev.pdf)

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