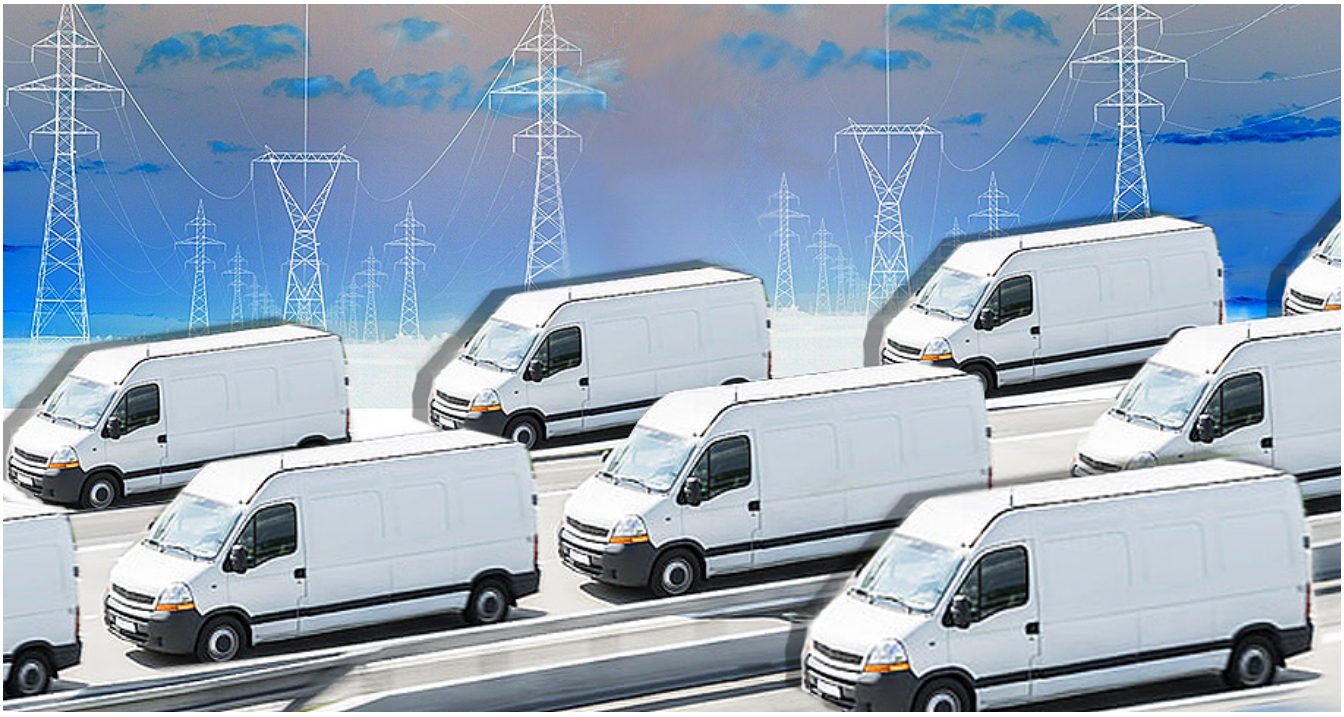
THE TRANSFORMATION OF THE ENERGY SECTOR

TECHNOLOGY

# 'Achilles' heel': How charging hobbles the electric truck

**David Ferris, E&E News reporter** • Published: Friday, October 16, 2020



Trucking and logistics companies that want to shift to an all-electric vehicle fleet are concerned that charging technology and the electric grid aren't advancing as quickly. Claudine Hellmuth/E&E News(illustration); PxHere(trucks); PxHere(grid towers)

*Second in a series. The first part can be found **here**.*

Electric truck fleets seem to be on express delivery these days. In June, California set an aggressive new rule to require them. Last month, Walmart Inc. said its fleet will be all-electric by 2040, and just last week, Amazon.com Inc. unveiled designs for a delivery van it wants to deploy by the tens of thousands.

"Last year, we all thought this world was a couple of years away," said Jonathan Levy, a vice president at EVgo, an electric vehicle-charging company. "And this year it's now."

But before the wheels of the electric truck stands a boulder. Several boulders, actually. All of them have less to do with the truck itself than how to deliver its electric fuel.

E&E SERIES


Delivery trucks are the new electric frontier. What stands to change? What stands in the way?

Making an electric truck turns out to be the easy part. Aligning the needs of the extraordinarily complex trucking and logistics industries with the slow-moving electric utility industry — that's the hard part. And experts worry that when the trucks start to march off the line in large numbers in two or three years, the chargers and electric grid won't be ready.

"The trucks are coming," said Mike Roeth, the executive director of the North American Council for Freight Efficiency. "Charging is the biggest challenge."

The electrification of commercial midweight and heavyweight vehicles — UPS step vans, boxy linen trucks, port haulers, garbage trucks and tractor-trailers — is gaining momentum. Nearly every truck maker is getting in on the action. Regulators and advocates are seizing on them as an effective lever against climate change.

First on the manifest is what are known as last-mile delivery vehicles. On the lighter side and with short, predictable daily routes in the city, they can have smaller batteries that help them compete on price with the industry's mainstay, the diesel truck.

There are also millions of them, and the coronavirus pandemic is only increasing demand for delivery e-trucks (***Energywire***, Sept. 25).

The difficulty — and also the opportunity — comes when dozens or hundreds of such vehicles return to their depots and plug in at night.

The upside is that a future grid could use those batteries as a colossal sponge, leveling out overall energy use by absorbing electricity at a time when homes and businesses are shuttered.

"I see these vehicles as a real opportunity for us to meet our other transition targets," said Pamela MacDougall, who works on grid modernization at the Environmental Defense Fund. Parking lots of e-trucks could make it easier to use renewable energy, lower the price of electricity and make the grid more reliable.

"Having this large amount of potentially controllable or adaptable load is a key piece," she said.

But a snarl of complications lie between here and there, and planners lack a playbook.

Automakers and energy companies have had years to sort through the problems of how to charge passenger vehicles like Teslas, Nissan Leafs and Chevy Bolts. The hurdles have been price and fear. An EV is more expensive than a car with a gas engine. There's also range anxiety, that the car's battery won't last the occasional road trip and that there won't be a place to charge it.

But according to interviews with more than a dozen experts in vehicles and charging, the electric fleet truck is a different animal.

Only one of the car's barriers — cost — applies to trucks.

A fleet manager doesn't worry about range because he knows exactly how far a delivery truck must travel each day. But it remains more expensive. That extra cost can be offset by the fact that the vehicle is much less pricey to maintain. Also, in most places, charging with electricity is a lot cheaper than fueling with diesel.

Experts said the real difficulty is the electric charger and the elaborate systems behind it. In fact, the entwined issues of ownership, contracts, standards, fees and regulation are so new and complicated, and moving so slowly, that it's not clear that the electric grid will keep up.

No grid, no trucks.

"If you choose the vehicle and didn't do the infrastructure, you missed the point. The infrastructure is the longer time horizon, the difficult part," said Bryan Hansel, the CEO of Chanje Energy Inc., an electric truck maker owned by a Chinese firm and based in Los Angeles.

"Those are going to be sitting idle in a parking lot for six to nine months, at best," he said of future trucks. "This is going to be the Achilles' heel of the industry."

So what are those weaknesses?

## 1. Trucks move faster than utilities

The core problem of electric trucks is the prodigious amount of electricity needed to recharge their batteries each night. If the flow of electrons needed to fuel a Nissan Leaf was a creek, the flow to a parking lot of multiton trucks would be the Mississippi.

The largest, most power-hungry battery among today's passenger cars is the Tesla Model S Long Range, with a battery that contains 100 kilowatt-hours of electricity.

That, or close to it, is the minimum battery for a midsize delivery truck. Class 4 trucks, which weigh at least 7 tons when loaded, are soon arriving from a wide array of truck makers, including Freightliner Trucks, Kenworth Trucks Inc., Mitsubishi Motors Corp., Navistar International Corp. and Peterbilt Motors Co.

A Model S owner can refill their battery in the garage with a charger that is easy to install and costs several hundred dollars. But for a fleet owner, the prospect is so complicated as to be mind-boggling.

"When they start to charge these trucks, they need a lot of the power, and they don't know how to do that," Roeth said. "We're seeing a lot of deer in the headlights."

Diesel, for all its pollution, is embedded in the landscape and easy to use. Smaller fleets go to a fueling station, just like cars, and larger fleets might have their own pumps on-site. A few minutes and they're ready for the next day.

The first difficulty is that a fleet depot, often aside a warehouse, has never needed to handle much electricity. "Our customers are already using most of the power they have available to them in their buildings for things like HVAC or conveyor belts to move packages," said Giordano Sordoni, a co-founder of e-truck startup Xos Trucks Inc.

To ready for a bevy of e-trucks, that depot needs to have as much electricity as a factory or other heavy industrial plant. That means new wires, and transformers, and trenches laid for charging stations, and the easements to make them legal. A lot of phone calls and meetings and permits.

"It becomes the long pole in the tent," said Michael Hughes, the chief commercial and revenue officer at ChargePoint Inc., the country's largest charging network, which is building out a business to serve fleets.

"It can take a couple of years in some places to get the electrical infrastructure, the utility drop, into the facility," he said.

It is not only the power company that is making things complicated.

The fleets picking these up don't want just any kind of electricity. They want wind and solar, according to a **survey** of early e-truck fleet adopters that was done by Ceres, a nonprofit sustainability group, and funded by Amazon.

"Companies and fleet operators expect utilities to meet the load growth from transportation electrification with new zero-emissions resources," Ceres wrote, "and will be reluctant to embrace EVs if it is met by building new fossil fuel generating units."

Over 80% of the survey respondents said that sustainability was their chief goal. Just over 60% said it was lower costs. Since the trucks haven't yet justified their benefits to the bottom line, the fleet owner views the electric fleet as something that must boost the company's environmental cred.

"It's all about sustainability objectives," said Rob Chapman, a vice president in charge of electrification and sustainability at the Electric Power Research Institute (EPRI). "Their investor groups are very focused on what their sustainability strategies are."

However, only a few utilities tailor their renewable offerings to make them easy to use for a corporate customer, like a fleet.

The complications around summoning enough electricity can put hard limits on how big an electric fleet can get.

"What ends up happening is you have all these pilots going on, and none of them can scale to the hundreds of vehicles," said Vic Shao, the CEO of Amply Power Inc., a company that provides fleet charging as a service.

## 2. Who owns what?

The shiny efficiency of a UPS delivery van might convey that the trucking and logistics industry is a monolith where change can rapidly ripple.

But in fact it is a layer cake. The operators and owners of the trucks, the companies routing the packages, and the leaseholders of the depots are often different enterprises that arrive at the question of e-trucks with conflicting agendas.

Here's some examples of the layers. The big parcel-delivery companies, including Amazon and FedEx Corp., sometimes contract with other anonymous companies to deliver packages, though the better-known name is emblazoned on the truck.

Other, lesser-known names populate the supply chain. Intermodal companies, like Schneider National Inc. and J.B. Hunt Transport Services Inc., run truck fleets as part of their systems to swap shipping containers among ships, trucks and trains. Other fleets don't own their vehicles, but lease them by the dozens from companies like Ryder System Inc. and Penske Corp.

These lower-profile companies would bear much of the expense of large-scale conversion to electric trucks but aren't as motivated to get the plaudits for going green.

Another barrier is land ownership. At the depot, the fleet operator often doesn't own the building or land. It is leased by a landlord that might not be enthused to make expensive upgrades to support EVs.

To this welter of players — truck makers, logistics companies, fleet operators, leasing agencies and landowners — add the charging providers, which provide some array of equipment and software. No charging company's offerings are quite the same as the next.

The complexity of these layers, Chapman said, is one of "the most challenging ones, because there's so many players involved."

Breaking the charging nut is so important that Chanje, the LA truck maker, dedicates 10 members of its 40-person staff to energy services. Among its clients is FedEx, for whom it is building charging stations at 42 depots in California.

The Balkanized industry means that electric trucks might have a difficult time moving beyond the top tier of well-known public companies that care deeply about their public reputations.

For the independent, lesser-known fleets, "it's still not really proven," said Jeff Wojtowicz, a professor who studies urban freight at Rensselaer Polytechnic Institute in New York. "I think a lot of people fall into the trap that Walmart or UPS bought a hundred trucks" and "a lot of policymakers get on the bandwagon" thinking that it's a trend — when in fact it might not be.

"The number of electric vehicles that these companies have in their fleets are miniscule," he added.

## 3. The 'bugaboo of demand charges'

The amount of electricity that a large-scale fleet of electric trucks would require is something few power companies have planned out.

According to consultancy Wood Mackenzie, the number of electric trucks on U.S. roads — about 2,000 as of last year — may grow to over 54,000 by 2025. Assume that each of those has a fairly average 100 kWh battery. Together, recharging those batteries would require 5.4 gigawatt-hours of electricity, or roughly what a large coal-fired power plant puts out in a year.

Except it would need that amount of juice every night.

Electric utilities have long had a tool to prevent its customers from sucking too much power. Called the demand charge, it makes the electricity more expensive if the customer crosses a certain threshold of energy use.

These charges can punish by pushing a customer's rate for an entire month higher, not just the moments it blips above the line. These demand fees have been a serious headache for companies that run public fast-charging stations for electric cars. If a bunch of drivers happen to plug in at the wrong time, the station can tip from making a modest profit to suffering a horrendous loss.

"The old bugaboo of demand charges" is what Chris Nelder, a mobility manager at the nonprofit Rocky Mountain Institute, calls them.

The problem is magnified when the subject is a fleet of energy-slurping trucks.

"Fleet operators are a fairly sophisticated bunch, but on diesel and gasoline," said Shao, the CEO of Amply, noting that prices for these fuels can fluctuate 25% in a year.

But with electric fuel, he said, "it could be up or down 400% in a single day. They've never encountered this. They can't budget for this. They don't know what their costs are next day, next week, next year. They have no idea. And since they don't know the operating cost, they can't scale."

Shao's company and a handful of others like Chanje and Electriphi Inc. are offering charging as a service for fleets, building out and operating the entire system. Taming demand charges is one of their big selling points.

These systems avoid demand charges by designing the system so vehicles aren't drinking from the straw all at the same time. Chargers switch on and off, swapping from one to another, to assure that each vehicle has the necessary electrons before the drivers get in their seats in the morning.

"It's a highly choreographed dance we do through software," Shao said.

The other solution lies with the utilities and the regulators, who could amend their demand charges to not penalize the fleet. States like California, New York, New Jersey, Colorado and even Texas are making moves in that direction, said MacDougall of EDF. But they haven't gotten far.

"There's still a lot of work needed out there," Nelder said. "We're still waiting for a lot of regulators and utilities to get their heads around this."

## 4. A lack of standards

The budding e-truck industry, like so many new, technology-heavy industries before it, is a long way from agreeing on the technical standards to govern it.

John Halliwell, a charging project manager at EPRI, said the goal is for any heavy vehicle to roll up to any charger and get the juice. "Interoperability means it works," he said.

Today it isn't yet working, and no wonder: A long list of truck makers are plunging into the new market, with few vehicles on the road. Charging providers, each with their own approach, are fighting to make their operating system the dominant one. Vehicles and electric chargers aren't yet designed to accept or dispense the same power levels.

Many lessons have been learned from passenger vehicles. It is there that the industry developed the Open Charge Point Protocol, a communications platform between the physical charging station and its network. The Open Charge Point Interface allows for data sharing between these networks.

But these standards haven't necessarily been adapted to the higher power needs of trucks.

A lot of ideas — some brilliant, some not — are being sorted out.

"If it's standardized, it levels the playing field. It's great to have things plugged in and to work," Halliwell said. But, he added, doing it too soon "can hinder imagination and invention of technologies."

## 5. What if there's a blackout?

A blackout causing fleet chargers to switch off in the middle of the night is a scenario that no one knows how to solve.

California is where the problems could be most acute. It is the most fertile ground for electric trucks, with multiple truck startups, utilities investing tens of millions of dollars in building the chargers to support electric fleets and a muscular new regulation that requires trucks to go electric by 2045 (***Climatewire***, June 26).

But it is also dogged by high-profile blackouts. Last year, utilities carried out power shut-offs to prevent wildfires, and this year, some customers had rolling blackouts because of a heat wave.

"If utilities cannot assure a reliable energy supply and provide tools to manage inevitable outages, fleet electrification will be difficult and costly," Ceres said in its report. "Ultimately, there is an increasing concern that vulnerabilities within the existing grid may lead to outages lasting days."

> **“This is going to be the Achilles' heel of the industry.”**
>
> *Bryan Hansel, CEO of Chanje Energy Inc., on the electricity infrastructure issues that could slow deployment of large fleets of electric trucks*

For a large electric fleet, an extended blackout would mean trucks idled and packages undelivered. This is one step too far for many fleets, which know they can deliver through a blackout if they're relying on diesel.

"That is the thing that scares them, and that's where we need to spend time," said Hughes of ChargePoint of his fleet customers.

One answer is to add energy storage to the depot, to give it its own source of backup power. But its energy needs may be so large and costly that the project no longer pencils out.

Yet without a reliable backup, "It won't be truly resilient," Shao said.

## 6. E-trucks for the little guy? 'Hell, no'

If going electric is difficult for Amazon, UPS and FedEx, with their vast resources, it is far harder for the smaller operators that make up most of the nation's trucks.

The next lower tier of fleets is often dedicated to delivering a particular company's goods. Some of the more well-known ones are trying out pilots.

One of the biggest is PepsiCo Inc., which is using several flavors of electric trucks at a Frito-Lay Inc. plant in California's Central Valley. Others are underway by companies including W.B. Mason (office supplies), Aramark Corp. (linens), and Loomis (armored trucking). But untold others have yet to start.

Beyond those are vast numbers of small "independents." These make up much of the U.S. fleet, and experts say that no viable path to electric trucks exists for them.

José Holguin-Veras thinks a lot about these scrappy little outfits as the head of the sustainable-freight group at Rensselaer. He thinks their operations, ones with fewer than five trucks, might comprise 80% of the truck market. No one knows for sure because the U.S. government long ago stopped counting.

"They are basically one-man or husband-and-wife operations," he said.

Since the barriers to becoming a trucker are so low — all you need is a commercial driver's license and a used diesel vehicle that can be bought for cheap — he sees it as one of the few routes into the middle class for people on the bottom economic rungs.

But it is also brutally competitive. Despite the boom in delivery, there are far more truckers than there is freight to truck. An electric truck may be cheaper to operate, but the higher sticker price makes it impossible for a company that is barely getting by.

"Are you going to consider buying an electric truck?" Holguin-Veras said. "Hell, no."

Even if the price of electric trucks continues to drop — and most analysts think it will — the charging of the vehicle remains a thorny vine. Refilling a diesel truck is fast and easy. But how does a small, hand-to-mouth fleet operator get their hands on a high-powered charging station?

"I struggle with how this is going to work," said Roeth with the North American Council for Freight Efficiency. "Where are you going to charge it when the customer takes the truck home?"

Many truck makers and fleet companies are getting excited about the possibility of a durable, affordable electric truck that makes the air measurably cleaner. But the promise exists alongside the many hurdles to plugging them in.

As Hansel of Chanje pointed out, "You can't buy one without the other."

Twitter: **@DavidFerris** | Email: **dferris@eenews.net**