THE TIME IS NOW

WHY GLOBAL DELIVERY AND LOGISTICS FLEETS ARE GOING ELECTRIC

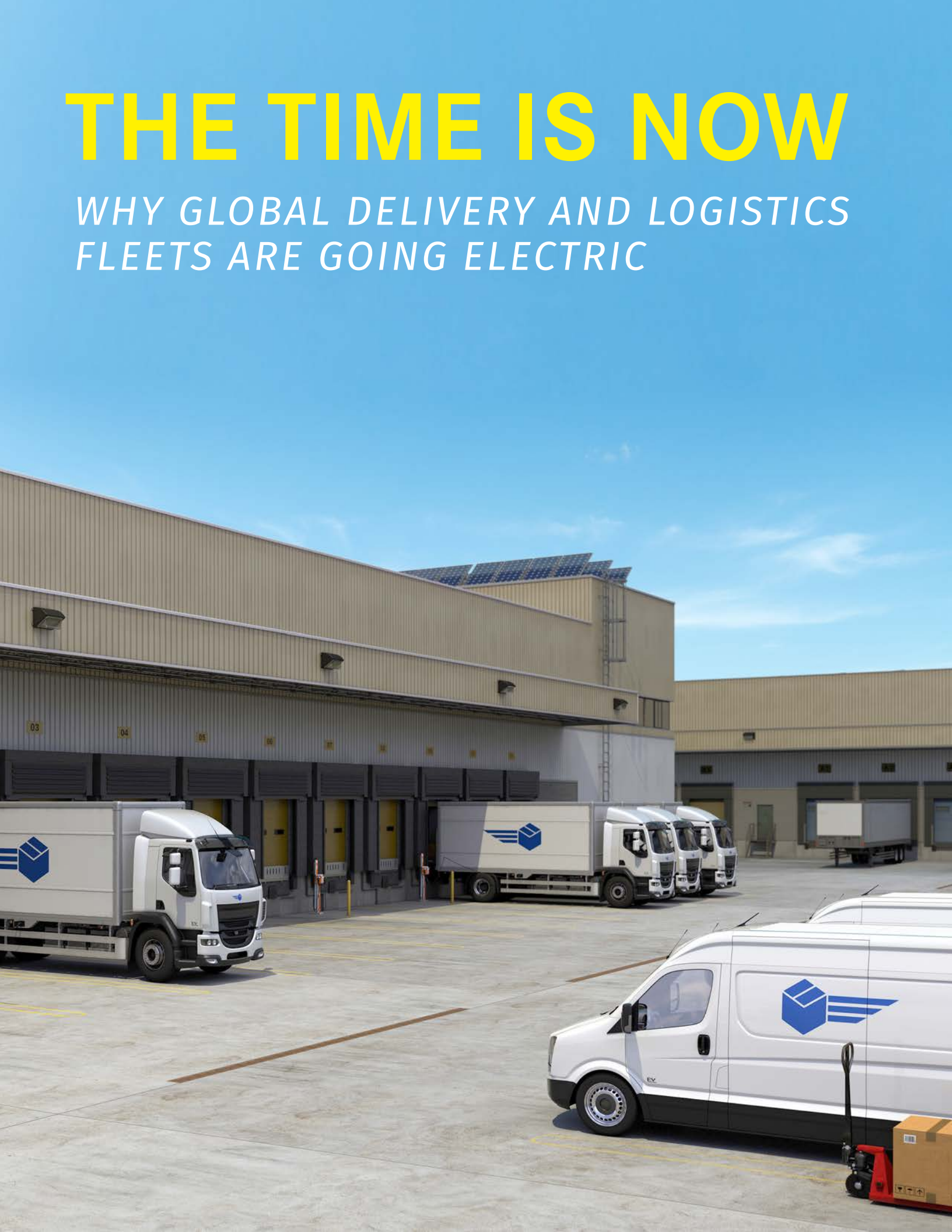


TABLE OF CONTENTS:

EXECUTIVE SUMMARY

Global e-commerce is exploding. The climate is changing. And batteries that can move an electric vehicle are more powerful and low-cost than ever before.

The result of these and other factors is that delivery and logistics companies around the world are beginning to adopt electric trucks and vans to move goods along last mile and regional shipping routes, across freight yards and from ports to warehouses. In particular, the last mile segment — the path that a vehicle takes from a distribution center to the doorstep of a home or business — can offer fleets an attractive lower total cost of ownership compared to a diesel-powered truck or van.

To be sure, the market is still early. In China and Europe last year, electric and plug-in hybrid vehicles made up 0.7 percent and 2.7 percent of new medium-duty commercial vehicle sales, respectively, according to researchers at BloombergNEF (BNEF). For light-duty electric commercial vehicle sales it was 1 percent in China and 3 percent for Europe. In the U.S., electric commercial vehicles were even lower, moving just several thousands.

But while the market is early, the time is now for the leaders of delivery and logistics fleets to pilot, buy and scale electric vehicles and plan and deploy charging infrastructure at fleet yards. Some of the world's largest last-mile logistics providers including Amazon, FedEx, PepsiCo and UPS — as well as brands that work with delivery and logistics providers such as IKEA — are aggressively electrifying their fleets and paving the way for smaller companies that potentially can benefit from these early moves.

GreenBiz conducted interviews with 16 fleet and transportation leaders in the delivery and logistics space in order to provide a comprehensive picture of both the key opportunities and challenges associated with this emerging market. GreenBiz partnered with charging infrastructure provider ChargePoint as the underwriter of this report, as well as a thought partner on the market.

The eight key takeaways are:

The last mile is going electric

Urban last mile delivery is beginning to swiftly electrify thanks to a beneficial total cost of ownership compared to diesel, city clean air policies and consumer-facing brands with strong climate commitments. Regional haul, drayage and yard trucks are also attractive candidates for electrification. Long haul logistics trucking will take longer to electrify.

01

Policy is an accelerator

Both mandates and incentives have been a major driver of accelerating the adoption of electric logistics and delivery fleets. Local, state and federal policies that can incentivize the vehicles, infrastructure and electricity have proven effective.

Federal and state mandates and city-led low and zero-emission zones have successfully led to fleets piloting and buying electric trucks and vans.

02

Local lessons are crucial

Fleets and their customers are learning important lessons through targeted local projects that can be replicated in other locations. These projects enable collaboration with both public and private stakeholders and provide a canvas for working through infrastructure complexities.

03

Software-led charging is vital as fleets scale

The more electric vehicles that companies have deployed, the more fleet leaders recognize the importance and necessity of using charging software to plan and dynamically manage charging at fleet depots. Ensuring that fleets can economically and efficiently manage growing sizes of electric trucks and vans will rely on networked connectivity, integration across cloud-based fleet management tools, including vehicle telematics, route planning and dispatch, and fleet asset management.

Energy innovation is emerging

Fleets in the process of scaling electric delivery and logistics vehicles are strongly considering distributed and clean energy options such as stationary storage, onsite solar and microgrids at facilities to better manage energy constraints. Electric fleets, when deployed at a large scale, will need to be planned and managed in a new way compared to diesel fleets and this can provide unique technology, efficiency and clean energy opportunities.

05

It's led to manufacturing innovation

Because of lack of vehicle availability from major OEMs in the short term, delivery companies have been partnering with upstart manufacturers in order to get the vehicles they want in the volumes they want, but supply constraints remain a real issue. This is an early market phenomenon and will shift as the market matures. More recently OEMs have launched new divisions focused on the delivery and logistics markets.

06

Next up is scale

Large global fleets that have aggressive climate goals and operate in regions with strong mandates are planning to swiftly move beyond electric pilot projects and scale their EV operations. The learnings from the early stages of this market will provide a valuable blueprint for scaling. Having strong partnerships early on can help companies scale effectively.

07

Stakeholder collaboration is key, but more is needed

Stakeholder collaboration — within organizations and externally across sectors — will be key to the success of this early market. But there needs to be better methods to connect disparate parties in an efficient way. Verticals that need more efficiency and holistic collaboration include utilities, automakers, real estate, fleets, sustainability and policy makers.

08

INTRODUCTION

The pandemic and its series of lockdowns have spurred a dramatic surge in e-commerce. McKinsey estimates that 10 years worth of e-commerce growth were condensed into a mere three months in the first half of 2020. Even before the pandemic, e-commerce has been growing globally and reached 16.1 percent of total U.S. retail sales as of the second quarter of 2020, according to the U.S. Census Bureau.

For delivery companies, this trend means more packages to deliver, more vans and trucks to carry those packages, and more carbon emissions associated with diesel trucks. "It's probably going to drive us to have a larger company and more vehicles," explained Russ Musgrove, managing director of global vehicles for FedEx Express.

For Angela Hultberg, head of sustainable mobility at IKEA Retail, Ingka Group, it means her transportation decarbonization goals of electrifying 100 percent of last mile home deliveries by 2025 are "chasing a moving target." "The pandemic has had a huge impact on last mile. That means we have to accelerate and really pick up the pace [of electrification]," said Hultberg.

While the demand for last mile delivery is surging, the real-world impacts of climate change are also accelerating with unprecedented wildfires in California, and blazing summer heat across Europe last year. Global retailers and delivery and logistics providers with growing truck fleets are concerned about their growing carbon emissions and the effect their footprint will have both on the planet and the reputation of their brands.

PepsiCo Fritolay campus in Modesto, California, p14

Corporate climate commitments soared in 2020, and slashing emissions from fleets will be required to meet any aggressive corporate climate goal. Consumer-facing brands — often with their names displayed on the side of the trucks double-parked around neighborhoods or outside of grocery stores — are facing unique pressure to decarbonize.

In addition to reputational pressures, myriad global regulations — both mandates and incentives — are pushing the logistics and delivery industries to adopt zero-emissions technologies. Some of the global governmental recovery efforts following the pandemic, such as the Biden administration's American Jobs Plan, are being tied to electric vehicle investments. Meanwhile, cities are playing a leading role in accelerating zero-emissions vehicles within their urban borders with the goals of cleaning up local air pollution, reducing traffic and slashing CO2.

Electric vehicle technology — both hardware and software — has become increasingly mainstream, lower cost and more sophisticated. The price of lithium-ion battery packs, which make up the bulk of the cost of the vehicle, has plummeted by 87 percent from 2010 to 2019, according to BNEF.

As a result, global automakers are taking electric commercial trucks and vans much more seriously. And as the upfront cost of electric vehicles comes down, the total cost of ownership of electric delivery and logistics vehicles is becoming increasingly attractive in many regions and oftentimes lower cost than diesel-powered trucks and vans.

Cloud-based software systems — some deeply integrated with legacy fleet management and telematics systems — are helping fleet leaders operate and charge electric trucks and vans as efficiently and economically as possible. As fleets scale the use of EVs, software will become a necessity to manage charging.

All signals point to 2021 as a global breakout year for the electrification of last mile delivery fleets, and the coming years will see major growth in electric trucks that move goods across other aspects of the shipping supply chain.

KEY OPPORTUNITIES AND CHALLENGES FOR ELECTRIC FLEETS

The Biggest Drivers of Electrification for Delivery and Logistics Fleets

Throughout the interviews with transportation and fleet leaders for this report, it became clear that a few key drivers are pushing and encouraging companies to adopt electric trucks and vans. Some of these primary levers include: corporate sustainability goals, regulation at various levels of government, an emerging lower total cost of ownership for electric commercial vehicles and mitigating business risk of not adapting to electric.

Corporate Sustainability Goals

Long the domain of early adopters and "green brands," corporate sustainability has gone mainstream in recent years. In 2020 alone, the amount of "net-zero" pledges by companies and governments more than doubled.

Delivery and logistics providers with aggressive sustainability goals will clearly need to tackle emissions from their owned vehicles as well as from third-party suppliers. Diesel-based road transportation is carbon-intensive and can make up the bulk of a logistics providers' carbon footprint. Of the fleet leaders surveyed for this report, every one of them has some form of sustainability goals launched or in development.

For example, PepsiCo — which uses 27,000 vehicles to move its beverage and food products — aims to be carbon neutral by 2040. "By nature of the math, an incredibly large portion of our fleet is going to have to be zero or near zero-emissions," said PepsiCo's senior director of fleet operations, engineering and sustainability, Steve Hanson.

It's not a coincidence that the consumer-facing brands are moving particularly quickly to make climate pledges. "For logistics, the reputational pressure is particularly strong. People are aware that the amount of deliveries is growing, and concerned about the environmental impact" said Sandra Roling, who heads up the EV100 program for The Climate Group.

But even shipping and logistics companies that don't have large consumer-facing brands are adopting sustainability commitments. NFI, a New Jersey-based third party logistics company, is in the process of developing sustainability goals. "We realize now more than ever that we really need to have these sustainability goals to partner with our customers," said James O'Leary, vice president, fleet services with NFI.

Regulations

The second universal driver of delivery and logistics fleet electrification is regulation, including federal, state-level and city-led policies.

At the very highest level, there's the Paris Agreement. While the international treaty may seem many steps away from the decisions that fleets make, many corporate sustainability goals are tied closely to Paris Agreement commitments.

European countries have been particularly diligent about implementing these policies, and the European Union has a goal to be climate neutral by 2050. The U.K. has a target to ban sales of conventional fossil fuel vehicles by 2030.

China has committed to peak emissions by 2030 and to achieve net-zero by 2060. The Biden administration has pledged to make the U.S. climate neutral by 2050, and just unveiled a plan to cut greenhouse gas emissions in half by 2030.

Country-wide climate goals can be a major driver of state and local policies. California — long a leader in climate regulation — is implementing the Advanced Clean Truck (ACT) rule in order for the state to meet its own aggressive climate goals. A first of its kind in the world, the ACT rule calls for truck and van manufacturers, and eventually commercial truck and van buyers, to deploy a certain percentage of zero-emission vehicles within a certain time frame (it varies by vehicle and company type).

Cities such as London and Paris have been important levers for zero emission vehicles and have created low-emission and zero-emission zones in city centers that ban, or sometimes charge, fossil fuel cars and trucks that want to enter. These zones create multiple benefits including reducing local air pollution, cutting down on traffic and slashing carbon emissions from tailpipes.

For fleet managers trying to adopt heavy-duty electric trucks, incentives in particular have been crucial. "Right now, you have to incentivize three things: the truck; the infrastructure; and the fuel. At the end of the day, everybody says they want to be sustainable, but very few want to pay for it," said NFI's O'Leary.

Total Cost of Ownership

One of the most promising drivers pushing the electrification of delivery and logistics fleets is the potential for a lower total cost of ownership (TCO) for electric trucks and vans compared to the diesel-powered equivalent. The lower total cost of ownership is something that fleet managers are keenly aware of.

TCO "is very attractive to fleets because the margins are pretty razor-thin in the transport business. Any type of advantage you can have, which puts you ahead of your competitors, is extremely attractive," explained Rich Mohr, ChargePoint's vice president of fleets.

The TCO for delivery and logistics fleets of electric versus diesel is a complex equation. It comes from a combination of factors such as the upfront cost of the vehicle, maintenance costs for EVs compared to internal combustion engine-powered vehicles and the lifespan of vehicle parts such as brakes. EVs commonly use regenerative braking, which produces significantly less wear and tear on brakes.

Another major contributor to operating costs is fueling — both the cost of electricity, which depends on geography, as well as how the vehicles are charged. Power management can help fleets charge at times when electricity prices are low and avoid charging when prices are high or get hit with demand charges. Dynamic software also can streamline a fleet's workflow to avoid costly vehicle down-times if charging is unexpectedly disrupted.

The TCO for delivery and logistics fleets is also highly dependent on factors such as the length of the routes, the size and range of the battery and the size of the load carried, among other factors.

ELECTRIC DELIVERY SECONDARY BENEFITS

Beyond some primary opportunities for electric delivery and logistics fleets mentioned — such as cleaner air, fewer carbon emissions, brand management and lower TCO — the transportation leaders interviewed for this report mentioned some secondary benefits. These benefits can provide indirect opportunities for drivers and communities who live along delivery routes.

Several fleet leaders interviewed for this report said that both the ability to recruit and retain drivers was an unexpected benefit of electric trucks. Attracting and retaining drivers, particularly young drivers new to the field, has been a challenge for trucking companies for years. Over half of truck drivers in the U.S. are older than 45 and 23 percent are over 55, according to labor market analytics firm Emsi.

Fleets found that having the latest technology, like electric trucks, is helpful to attract new trucking talent. "Electric trucks are a huge recruitment opportunity for us," said Sysco's Neil Russell.

For the most part, fleets' electric trucks were also found to be highly used. They also helped with driver satisfaction, once drivers got used to operating them. Companies found that introducing electric trucks into their fleets had an initial period of hesitation and a learning curve for drivers, but afterwards drivers enjoyed the electric truck's quiet operations and less vibration from the battery-power.

"Feedback from our drivers is positive. Having an eight-hour day on a [diesel] truck is much more difficult than on an electric truck — less noise and less vibration is a benefit for them and the economy," said DB Schenker's head of European fleet management, Tristan Keusgen.

"I have not found a driver that was not happy making the move to an electric vehicle... It is a big cost to maintain drivers, and to keep them happy and healthy," said ChargePoint's Rich Mohr, former CTO of Ryder.

"I have not found a driver that was not happy making the move to an electric vehicle... It is a big cost to maintain drivers, and to keep them happy and healthy."

Rich Mohr, ChargePoint

Drivers aren't the only ones that like the quiet operations of electric vehicles. Communities along delivery routes and around distribution centers don't only benefit from cleaner air but also from decreased noise pollution.

The quiet operations can even enable some delivery and logistics companies to expand, or shift, the hours they operate. Because of their silent drive trains, electric trucks can be used to deliver goods during hours, such as early mornings or night shifts, when humming diesel-powered trucks previously were banned or discouraged.

ALEXFAN32 / SHUTTERSTOCK.COM

Electric delivery vehicles that have condensed urban routes, are carrying lighter consumer packages and can return to a depot to charge at night tend to have an attractive TCO. Electric heavy-duty semi trucks that drive across state lines for days and don't return to a centralized depot for charging have a much less attractive TCO for now.

Software and smart charging has been particularly useful to fleets to help ensure an attractive TCO.

The attractive TCO is what's making last-mile electric delivery vans begin to scale rapidly. "In the U.S., Europe and China, we see that the total cost of ownership of logistics delivery vans in the light commercial vehicle segment can already be as cheap or cheaper than those with equivalent diesel in many cases," said BNEF's Nikolas Soulopoulos.

The leaders of large fleets — such as FedEx's 70,000 trucks and vans — are particularly looking to rapidly adopt last-mile electric vans as a way to lower costs. "Everything class 6 and below is economical now. From a TCO perspective, we think there is a significant advantage from a cost perspective in making this transition," said FedEx Express' Musgrove. Musgrove and his team plan to buy around 3,500 electric vehicles per year starting in 2025.

TCO is one of the most important driving factors, because it's the beginning of a market that doesn't rely on regulations or sustainability goals. Instead, fleets can adopt the emerging technology because it's cost-effective.

"In the U.S., Europe and China, we see that the total cost of ownership of logistics delivery vans in the light commercial vehicle segment can already be as cheap or cheaper than those with equivalent diesel in many cases."

Nikolas Soulopoulos, BNEF

The Risk of Not Acting Now

Finally, one key driver that many fleet leaders interviewed for this report cited as important is — quite simply — the ability to manage the business risks associated with a changing world.

Global automakers are shifting resources to electric, the climate is changing rapidly, customers are demanding sustainable alternatives and cities (many in Europe) are banning diesel trucks from downtown regions. If the trends are permanent, and they look as if they will be, companies that don't adapt in a timely manner might struggle.

For a company like IKEA, which wants to deliver its goods to the doorsteps of customers across London, Paris and Berlin, it needs zero-emission delivery trucks just to reach its customers' front doors. "If you are not on this journey, you are at real risk of being left behind," IKEA's Hultberg said.

Likewise, the transportation leaders at German logistics giant DB Schenker see alternative vehicles such as electric as an inevitable transition that the company needs to adapt to. "Electric will be an important factor for providing future logistics solutions. We don't have an option really not to do it, to be able to basically function as a business in the long-run," said Elke Lindner, head of sustainability, Europe, DB Schenker.

Considering that fleet electrification is a journey, companies that start the journey sooner could have a competitive advantage. As The Climate Group's Roling put it: "It is much easier to get on the learning curve now."

> **"If you are not on this journey, you are at real risk of being left behind."**
>
> **Angela Hultberg, IKEA**

THE BIGGEST HURDLES FOR ELECTRIC DELIVERY AND LOGISTICS FLEETS

Across the board, the fleet leaders interviewed for this report cited two major hurdles for the market for electric delivery and logistics companies: a lack of vehicle availability and the complexities of planning and deploying charging infrastructure.

Early Market for Electric Trucks and Vans

While passenger electric vehicles are becoming more mainstream, the market for electric delivery and logistics trucks and vans is still at a relatively early stage.

Some of the world's largest automakers have been slow to deploy commercial electric trucks at scale, citing an initial lack of demand. In the past year or so, these companies have shifted their efforts and are more quickly developing and manufacturing electric trucks.

But the result has been that many fleet managers can't go out to buy the volumes of electric trucks they want and need, at the price point they want and with the features they want. PepsiCo's Steve Hanson said: "Every electric truck that we have purchased is pre-production, so there are going to be a ton of lessons learned associated with that."

For companies that need the heaviest of trucks to move containers and really big machinery, it's been the most difficult. Sysco's Neil Russell said: "Our EV fleet has a unique need that doesn't exist in the marketplace. Vehicle availability is the biggest barrier."

Because of the lack of desired electric trucks from the world's biggest companies, many fleets have worked with startups and newcomers to the electric truck world, including Rivian, Arrival, Lightning eMotors, Lion Electric, Workhorse and Chanje. These upstarts have been providing fleets a unique opportunity to co-develop vehicles, but startups also introduce greater risks than logistics companies might not be accustomed to.

Many of the first electric logistics trucks from the big OEMs are being delivered to fleets now to pilot this year. Expect 2022 to be a big year of growth for delivery and logistics companies placing orders for more electric trucks and delivery vans.

Navigating the New Fueling Network

After a lack of vehicles, fleets pointed to the complexities of planning and deploying infrastructure for electric delivery and logistics vehicles as a new challenge compared with the ease of tapping into already-established diesel fueling networks.

Because electric charging networks are a newer technology for most fleets, the process of planning and deploying electric-ready fleet depots faces a learning curve and some investment. New internal teams are commonly required to deploy EV infrastructure — across facilities, energy, sustainability, engineering and the C-suite — in addition to the fleet team. That's unlike the already established teams that traditionally manage buying and fueling up diesel trucks.

> **"The reality is that charging infrastructure, electricity and utility connections, is probably the most challenging part of this equation."**
>
> **Ross Rachey, Amazon, at VERGE 20**

Similarly, the economics of making charging cost-effective can be complicated, depending on the vehicle application and local utility pricing. Managing charging infrastructure is often an entirely new way of operating compared to diesel fleets as more fueling needs to happen on site and takes longer so there is less flexibility about how and when charging happens. As fleets scale EVs, organizations are increasingly relying on smart software to manage the complexities of charging.

Amazon's Ross Rachey said at VERGE 20: "The reality is that charging infrastructure, electricity and utility connections is probably the most challenging part of this equation."

For the biggest and most aggressive fleets, the long timelines required to get power infrastructure from the local utility to charging depots has been a point of frustration. "If you ask me what keeps me up at night now, it is 100 percent utility. It is all about getting the power to the depots," said FedEx Express' Russ Musgrove.

For fleets offering third-party logistics services to retailers that want to use electric vehicles, there's tension between the length of a logistics contract and the lifetime of charging infrastructure. "If I sign a new piece of business with a customer tomorrow, it is only for three to five years. But the investment that I have to make by putting in the infrastructure spans a much longer timeline," noted James O'Leary with NFI.

Holistic, long-term planning — including careful consideration of future scaling — is important when starting an infrastructure charging project. "Laying conduit is very cheap when the ground is open. It becomes very expensive when you have to dig up parking lots and interrupt operations to make it happen," said PepsiCo's Hanson.

Many fleets that are piloting electric trucks soon will move from the pilot and project phase into the scaling phase. The companies might have one to three EVs now, which easily can be charged individually and without a holistic plan.

But as companies scale to dozens or even hundreds of electric vans or trucks, they'll need to rely on integrated software, managed charging and a much more holistic approach to energy and infrastructure.

YAU MING LOW/SHUTTERSTOCK.COM

LEADING LESSONS LEARNED BY FLEET LEADERS

Regardless of whether delivery and logistics fleets are at the very beginning, or smack dab in the middle, of their electrification journey, companies are learning valuable lessons along the way. Here are six key lessons that fleet leaders have learned through their deployments:

1. Local Lessons Are Crucial

Fleets are using local site-specific projects to test and deploy technologies and systems that can be replicated and scaled elsewhere. The lessons learned through these projects include knowledge about how to tap into available incentives, how to work with a diverse group of stakeholders, how charging hardware and software work in tandem and what energy demands are needed for certain routes and truck types.

UPS' SMART GRID SITE IN LONDON:

UPS was faced with a constrained, older building at one of its London campuses, where it could only charge up a maximum of 65 electric vehicles. Getting more power to the building proved to be challenging, so UPS developed a strategy of working with tech partners and the U.K. government to develop, fund and deploy "the world's first combined smart grid and energy storage solution," described UPS' Peter Harris. The project tripled the number of EVs that UPS could charge overnight without needing any further grid upgrade investment and it provided valuable lessons for future charging projects.

PEPSICO'S MODESTO, CALIFORNIA, CAMPUS:

Working with an extensive group of stakeholders, and using local incentives, PepsiCo was able to turn its FritoLay campus in Modesto into a "template" for future deployments, explained

WILLY BARTON/SHUTTERSTOCK.COM

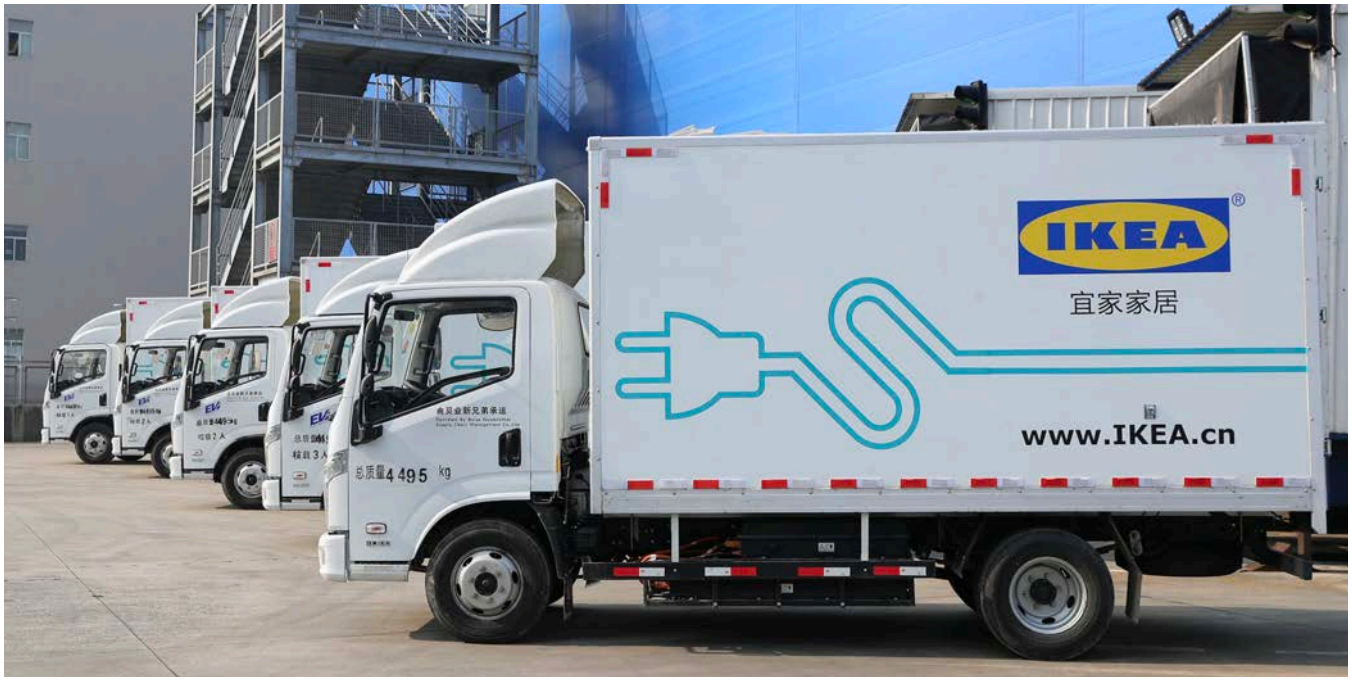
PepsiCo's Hanson. The project deployed 60 alternative-fueled vehicles, a combination of tractors, box trucks, yard trucks and forklifts that run off batteries, natural gas and renewable natural gas. The site is using electric vehicles from Peterbilt, BYD, Tesla and Crown and natural gas tractors from Volvo.

IKEA'S EV SHARING NETWORKS:

One of IKEA's goals is to electrify last-mile delivery for the downtowns of five global cities: Shanghai; Paris; Amsterdam; Los Angeles; and New York. Each city will act as a test bed for deployments that could be used elsewhere in similar urban environments.

In Shanghai, IKEA was able to relatively easily use electric vehicles thanks to a collaboration with warehousing and distribution partner Beiye New Brother Logistics Co. and electric vehicle leasing company DST. IKEA was able to lease shared electric vehicles and use charging infrastructure from the two companies.

The electric vehicle sharing platform worked so well for IKEA that the company has been working on sparking a similar ecosystem in the U.S. In recent months, IKEA announced it has invested in and is working with a startup called Fluid Trucks, which is building an EV truck-sharing network.



2. Stakeholder Collaboration is Imperative

The need to work with diverse external partners, as well as a range of internal team members, emerged as a major theme for fleet leaders that are deploying electric trucks and vans and their accompanying infrastructure.

"There are so many different stakeholders involved, and we have to keep all of them front of mind when you work through it. To pull all of it together, it takes a lot of blood, sweat and tears from a lot of great team members to make it happen," said PepsiCo's Hanson.

In contrast to the siloed team that buys diesel trucks and oversees fueling budgets, delivery and logistics companies that are deploying electric vehicles often need to include a wide range of team members. These teams could include members across fleet, facilities or real estate, energy, engineering, sustainability and often the C-suite. Companies that have strong corporate sustainability goals and buy-in from C-level team members said they have more support and better results through the electrification journey.

Beyond internal teams, external collaboration — particularly public and private partnerships — is proving crucial in this early stage of the electric logistics market. Industry groups and NGOs can help companies tap into incentives. And wider collaborations are needed between disparate parties such as utilities, automakers, tech providers, policymakers and fleets.

The global shipping provider XPO Logistics — which operates 7,800 tractors — is piloting one of Daimler's Freightliner eCascadia electric semi trucks at its facility in Hayward, California. XPO Logistics' Tim Staroba, senior vice president of less-than-truckload operations, said that the local public agency in the San Francisco Bay Area, the Bay Area Air Quality Management District, proved crucial in helping get the electric truck pilot funded. "We're looking at understanding anything that can reduce the environmental impact for the communities and the customers we serve," said Staroba.

3. Smart Charging Software Is Vital

As delivery and logistics fleets scale electric vehicles, smart, integrated software is becoming a necessary tool to manage the charging of multiple vehicles in the most energy efficient and cost effective way possible.

On smart software, FedEx Express' Musgrove said: "It is kind of the key. It becomes really critical that we use software to facilitate each route and manage the energy available at each station." FedEx already was operating close to 3,000 EVs by the end of 2019 and half of its new package and delivery fleet purchases are planned to be zero emission by 2025.

The most effective and dynamic charging platforms can use disparate data from multiple sources such as various vehicle telematics systems, local utility data and electricity rates, as well as information about each fleets' unique scheduling needs. Smart software can take all of this data and manage the charging time and speed in real time, avoiding high demand charges and peak rates, and at the same time make sure that the necessary vehicles can be charged and ready to perform as needed. For third-party fleets, software also can facilitate payment for fueling at the depot.

Organizations scaling electric fleets are relying on smart charging to enable an attractive TCO for operating electric vehicles in the least expensive way possible.

"Dynamic charging is critical for scale," said ChargePoint's senior product marketing manager, John Andrews.

> **"It is kind of the key. It becomes really critical that we use software to facilitate each route and manage the energy available at each station."**
>
> **Russ Musgrove, FedEx Express**

4. Energy Innovation Is Emerging

Smart charging is also helping to enable fleets to investigate energy innovation. Distributed energy and energy storage have emerged as a keen place of interest for fleet leaders aggressively scaling electric.

On-site solar and battery banks can help fleets avoid parts of the expensive and time-consuming task of working with the local utility to get more power to the charging depot. Again, FedEx's Musgrove said: "In some countries we are actually looking at coming off the grid totally and generating our own energy and becoming totally energy independent of the utility."

Microgrids and stationary batteries can further help fleets avoid peak and demand charges, as well as add resiliency to fleet depots, enabling fleets to insulate from blackouts. Amazon, likewise, is looking closely at microgrids, solar and batteries for facilities as a way to tightly manage charging and have more flexible choices for its grid needs.

Using onsite solar, or pairing charging with remote solar plants, also can help fleets lower their carbon footprints even further. Some fleets have adopted mobile solar units that can get up and running quickly and can be easily moved around a charging depot.

5. Scale Requires Holistic Thinking

As many fleets move from having a few electric vehicles to having dozens or hundreds of electric trucks and vans, companies will start thinking in new ways for how to manage fleets and energy in a holistic way compared to diesel trucks.

"We need to analyze how we need to adopt today's processes and the thinking on how we plan routes due to the limited range of the trucks. It is important for us to gain experience in the field instead of simply using a blueprint to decide on the technology to be used in the future," said DB Schenker's Tristan Keusgen.

For many fleets, the most efficient and cost effective way to charge fleets is generally to plug them in so they charge slowly overnight. Other fleets require fast charging and can benefit from the ability to share power across chargers.

Fleets can use smart software to proactively charge up when there's extra grid capacity, like the ample solar energy created in California during the day. Fleets could get a lower electricity rate when charging during certain favorable utility windows.

Down the road, electric logistics fleets also could provide the grid with more resiliency through vehicle-to-grid integration. The idea is that the energy stored in the batteries of electric vehicles could eventually provide power back to the grid when needed and at convenient times for the fleet. Again, the fleet could be compensated for this service, lowering the TCO of electrification even more.

6. Fleets Are Innovating with Manufacturing

Because many fleets haven't been able to find electric trucks that suit their applications at a price point they can afford, many companies have teamed up with young manufacturing startups. These startups have been co-developing electric vehicles tailored specifically to the fleets' needs.

Amazon is working with Rivian; UPS is working with Arrival; and IKEA has projects with Renault and MAN, through which the companies developed an electric vehicle and then presented it to IKEA's logistics suppliers.

"We had to roll up our sleeves, get on the engineering floor, and start developing a truck. We cannot wait. We do not have time. Our target is 2025," said IKEA's Hultberg.

Likewise, Amazon's Ross Rachey said at VERGE 20: "We realized we needed to take an active role in accelerating the products and the technology. What that meant for us was we decided to do it ourselves with a partner that shares the somewhat audacious vision of what electric vehicles should be capable of."

"I look at what we're doing with Arrival as sowing the seeds for a wider change in the market supply of commercial EVs. We will see more suppliers, more players, entering that space and that is good. Because competition is always welcome," said UPS' Harris.

Working with manufacturing startups carries some inherent risk, namely that the small automakers won't be able to scale up production fast enough to meet supply. Or that they won't be around long enough to deliver on their orders.

But the fleets that are accustomed to working with startups over the years have pointers on that, too. FedEx's Musgrove said in contracts with suppliers he has clauses for "infant mortality" and "performance," which can help reduce the fleets' liability for trucks that don't work as advertised.

For Amazon and UPS, risk mitigation means equity investments in their start-up partners, which can help the young companies scale and deliver on orders.

The emergence of this phenomenon — of the biggest delivery and logistics fleet companies getting so far into the weeds on vehicle development — is the product of an early market. At the end of the day, the larger OEMs eventually will scale up their electric truck production, and there inevitably will be some consolidation with the bigger companies buying the smaller ones.

"I look at what we're doing with Arrival as sowing the seeds for a wider change in the market supply of commercial EVs. We will see more suppliers, more players, entering that space and that is good. Because competition is always welcome."

Peter Harris, UPS

CONCLUSION

The bulk of the delivery and logistics industries are just beginning the journey to explore, pilot and deploy electric trucks and vans. But some of the world's largest companies — and particularly strong consumer-facing brands — are aggressively adopting electric vehicles for last mile delivery and are in the beginning stages of scaling these vehicles and the accompanying infrastructure.

These bold and necessary efforts will provide valuable lessons for smaller logistics and delivery companies that don't necessarily have the incentives or balance sheets that are helpful to drive electrification at this early stage of the market.

As more companies set aggressive climate goals, and more countries, states and cities enact policies that encourage zero emission commercial vehicles, this market is expected to grow rapidly.

The lower total cost of ownership for commercial electric vehicles will be a major key to kickstarting this market. When fleets can look at electric delivery and logistics as lower cost, in addition to being cleaner and quieter, making the decision to buy an electric truck or van will be a no-brainer.

At that "tipping point," the lessons learned by these early electric delivery and logistics leaders will be even more valuable, and the biggest challenges will evolve as the market grows. The types of commercial vehicles that can begin to electrify also will start to shift as batteries continue to drop in cost. At some point, over-the-road trucks will begin to be more attractive to electrify.

BNEF researchers predict that by 2040, 60 percent of light commercial vehicles sales and close to a third of medium commercial vehicle sales in China, Europe and the U.S. will be electric. The fleets that begin the electric journey now will be primed for this electric future.

ABOUT THIS RESEARCH

This report summarizes the findings from one-on-one video interviews with 14 fleet and transportation leaders and researchers over several weeks in March and April 2021. The report also includes the thoughts from an hour-long interview conducted at VERGE 20, GreenBiz's annual clean economy conference in late October 2020.

THE TRANSPORTATION LEADERS INTERVIEWED INCLUDED:

Ross Rachey
Amazon Logistics
Director, Global Fleet & Products
via VERGE 20 Interview

Nickolas Soulopoulos
Bloomberg New Energy Finance
Analyst

Tim Campbell
Campbell Consultants

Rich Mohr
ChargePoint
Vice President, Fleet Solutions

John Andrews
ChargePoint
Senior Product Marketing Manager

Sandra Roling
The Climate Group
Head of EV100

Tristan Keusgen
DB Schenker
Head of European
Fleet Management

Elke Lindner
DB Schenker
Head of Sustainability,
Europe

Russ Musgrove
Fedex Express
Managing Director

Nate Springer
GNA
Director, Market Development

Angela Hultberg
IKEA
Head of Sustainable Mobility

James O'Leary
NFI
Vice President, Fleet Services

Steve Hanson
PepsiCo
Senior Director, Fleet Operations,
Engineering and Sustainability

Neil Russell
Sysco
Senior Vice President
Corporate Affairs and Chief
Communications Officer

Peter Harris
UPS
Head of International Sustainability

Tim Staroba
XPO Logistics
Senior Vice President

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chargepoint