

The background is a solid blue color. It features several thick, curved, cyan-colored lines that sweep across the page from the top-left towards the bottom-right. Interspersed among these lines are three glowing, spherical cyan objects that resemble light bulbs or data nodes. One sphere is positioned on a line in the upper right quadrant, another is on a line in the lower right quadrant, and the third is on a line in the lower left quadrant. The overall aesthetic is clean, modern, and tech-oriented.

brightdrop

WHITEPAPER

# Living in the Last-mile Ecosystem

## Introduction

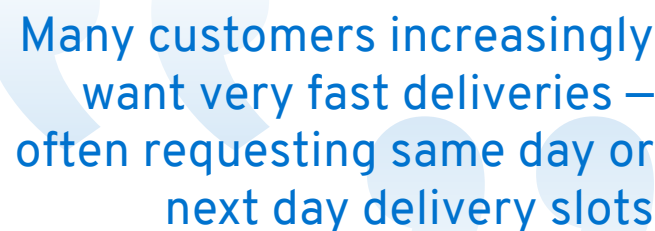
In 2021, U.S. retail eCommerce sales hit [\\$768 billion](#). This was up from \$425 billion in 2014. By 2025, it is estimated to be \$1.3 trillion. To put it another way, that's growth of nearly 70% in just four years. For eCommerce companies and fleets, this represents huge opportunities, but it also presents big challenges in today's delivery environment. These challenges include offering sustainable deliveries, improving delivery efficiencies, reducing labor costs, and enhancing the customer experience.

With the demand for deliveries increasing faster than ever, eCommerce companies are facing fulfillment concerns. More deliveries create a need to hire many more delivery drivers and warehouse pickers during a time of major labor shortages. According to a major news source, at the end of September 2022 there were 10.7 million U.S. job openings and 4.1 million people quit their jobs. These numbers do not account for the recent mass layoffs in the technology sector at two social media companies but do reflect the challenges that businesses face today.

Another big challenge eCommerce fleets face is meeting consumers' growing sustainability requirements. The growth in eCommerce package deliveries since the start of the pandemic has [increased traffic congestion and carbon emissions](#) in densely populated areas. We believe there are concerns about the rise in emissions across the country. Customers care about this issue enough that they are willing to make concessions to

achieve sustainability. For example, according to a recent survey published in greenbiz.com, 70% of consumers are "[willing to delay home deliveries by about 5 days](#) if given an environmental incentive to do so at the time of purchase."

While the opportunity to delay delivery to protect the environment may be the choice of some, many customers increasingly want very fast deliveries — [often requesting same day](#) or next day delivery slots. Major [global supply chain issues](#) and [driver shortages](#) mean that delivery delays are quickly becoming a challenge for eCommerce companies. Retailers are scrambling to [find innovative solutions](#), but customers [may not remain loyal](#) to companies that can't solve logistics issues and deliver goods in a timely manner.



**Many customers increasingly want very fast deliveries — often requesting same day or next day delivery slots**

All of this is contributing to the overall need for improved delivery efficiencies. Without a holistic approach to deliveries, companies may struggle long into the future. We believe it's very possible these inefficiencies may contribute to increasing labor costs, delivery times, and emissions.

## Innovative solutions

While hiring more drivers and deploying more vans will likely be used to address these challenges, innovation is another part of the solution. After all, eCommerce warehouses are innovating heavily – such as with automated ‘goods-to-person’ product retrieval systems. Such systems can be costly to implement and scale, but they can radically improve efficiency. Many last-mile delivery fleets have not been keeping pace with this level of innovation. All too often, last-mile fleets are simply composed of aged internal combustion vans, with packages loaded haphazardly in the back.

At BrightDrop, our products and services are centered around innovating the future of deliveries. To help solve delivery challenges, we offer an electrified ecosystem, including [BrightDrop Zevo](#) electric delivery vans, [BrightDrop Trace](#) eCarts and [BrightDrop Core](#) software. The BrightDrop ecosystem is built to support the entire delivery process, from the moment an item leaves the distribution center.

Our products and services are designed to help increase delivery efficiencies, which means fewer touches for delivery drivers, helping ease the pressures of the labor shortage. Meanwhile, full electrification means zero tailpipe emissions in the communities in which you operate.

### We’re doing all this in these key ways:

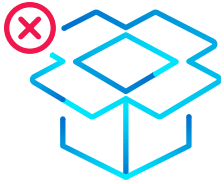
- ① By implementing containerization of package delivery with the BrightDrop Trace eCart and grocery fulfillment BrightDrop Trace Grocery. Additional uses for Trace technology are being researched and developed for application for other industries as well.
- ② By rethinking last-mile delivery vehicles with our purpose-built BrightDrop Zevo electric delivery van.
- ③ By supporting and tying together the entire ecosystem with BrightDrop Core software<sup>1</sup>, an intelligent, constantly connected fleet management and delivery optimization platform that helps customers get the most value of their BrightDrop products.
- ④ By providing extensive support to cover the charging infrastructure, as well as a full range of after-sales services, maintenance and support.

<sup>1</sup>May require a separate subscription.

PART ONE

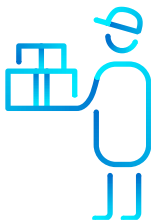
# The Containerization of eCommerce

## Issues with legacy package delivery



7-11% of eCommerce orders arrive damaged

**Packages get damaged** - In a 2020 study regarding customer service and retention, findings showed 63% of U.S. customers would [buy from a different supplier](#) if they get poor customer service. Yet research also shows that 7-11% of eCommerce orders [arrive damaged](#) (rising to 21% for large products). We believe some of this damage may be caused by poor sorting, lack of organization, and packages simply tossed in the back of vans.



The number of non-fatal injuries amongst delivery drivers rises every year

**Physical stress and strain on drivers** - Aside from damaging packages, manually lifting and moving sometimes very heavy parcels out of vans can cause significant physical stress and strain for delivery drivers. According to the U.S. Bureau of Labor Statistics, from 2015 to 2019, the amount of non-fatal injuries to delivery drivers rose every year. [In 2019, 8,020 nonfatal injuries occurred.](#) These injuries can happen when manually lifting and moving sometimes very heavy parcels out of vans causing significant physical stress and strain for delivery drivers. Injuries can also occur when a parcel falls on a driver, or a driver falls out of the delivery vehicle.

Taking packages out of a van one at a time to carry them up to customers' front doors is incredibly inefficient.

**Inefficient delivery processes** - Taking packages out of a van one at a time to carry them up to customers' front doors is incredibly inefficient. This way of working results in couriers constantly returning to their vans, moving very short distances, and re-parking in order to save time.

There's also the issue of Curbageddon to consider. Curbageddon is the "[very modern problem](#)" of delivery drivers stacking and sorting piles of packages on sidewalks. Again, this problem stems from the haphazard practice of slinging individual packages into the backs of vans that then need to be sorted mid-route. It's a problem because it is creating obstacles on city streets across America, blocking pedestrians and traffic as the vehicle sits idle blocking driving lanes. Additionally, for the driver to have to stop and do mid-route re-sorts in this way is time-consuming and inefficient.

## Containerization – the BrightDrop solution

BrightDrop Trace is an enclosed, electrified delivery cart that changes the way package delivery is done. Packages can be sorted into Trace at the fulfillment center, where they stay locked away until the cart is wheeled up to the customer or drop-off location.

This effectively containerizes eCommerce. The system can help reduce package touches, eliminating the need to run sidewalk-based sorting operations, and therefore help reduce the problem of Curbageddon. It also can help increase the number of packages each courier can handle per day. In an initial pilot, the Trace eCart was able to deliver 25% more packages per day<sup>2</sup>.

**Packages can be sorted into Traces at the fulfillment center, where they stay locked away until the cart is wheeled up to the customer or drop-off location.**

When the eCart is off the van, it is powered by an electric hub motor that matches courier walking speed up to 3 mph<sup>3</sup>. This electric propulsion capability helps Trace reduce stress and strain on the workforce, with minimal physical handling of packages needed. The result is that drivers can disembark from the van with large amounts of pre-sorted packages, enabling them to service much larger areas without having to keep returning to

and moving the vehicle. The Trace is also highly maneuverable so that it can be easily and safely navigated in tight or crowded areas. Meanwhile, the BrightDrop Core software<sup>4</sup> keeps the Trace connected, ensuring that your personnel can stay in constant communication with your eCarts and fleet managers can better learn how to improve efficiencies (see part 3 for more information on our connected software offering).

**Versatility for many last-mile deliveries** - Trace can also be used in many innovative ways. Rather than having one driver managing a van full of Trace eCarts and delivering all packages by him or herself, the Traces can be dropped off in several locations. Each Trace can then be accessed by authorized workers or a local courier for final delivery, with the eCart picked up again by a van at the end of the round.

**A better way to fulfill online orders: Addressing the new needs of grocers and consumers** - Just as the BrightDrop Trace eCart helped to address the multiple modern issues of last-mile package delivery, new challenges of online grocery order fulfillment can be addressed with the BrightDrop Trace Grocery. According to a well-known research initiative, since 2021, online grocery sales have increased by nearly to \$24.1 billion and do not show any signs of letting up. Because of this shift in fulfilling online orders, and the expense of doing business, grocers have had to look for ways to address this growing need without impacting their bottom line.

<sup>2</sup>Individual results may vary.

<sup>3</sup>The Trace has a maximum payload capacity of 200 lbs.

## Trace Grocery features

Trace Grocery can help grocers speed up fulfillment and pickup. It provides grocery retailers with a way of improving efficiencies while helping keep costs in check. In retail tests of Trace Grocery, productivity increased because staff was saved from unnecessary trips back and forth – especially with cold or freezer items – and could pick and pack in one trip. Food safe temperature compartments kept cold items cold for up to four hours. Shoppers still enjoyed the convenience and flexibility of online ordering and pick-up or delivery.

### Trace Grocery features:

- Nine compartments to segment items by order, temperature and product type for optimized pick-ups
- Electric propulsion-assistance and flexibility so it easily maneuvers inside and outside of a grocer's store to help reduce costly staging and infrastructure requirements
- Ability to move up to 350 pounds of groceries, helping reduce physical strain on the labor force
- Auto-braking to stop the electric motor that matches an operator's walking speed up to 3 mph
- Temperature management to store items at food-safe temperatures for up to four hours
- Weatherproofing to handle variable temperatures and outdoor elements with ease





PART TWO

# Re-imagining Last-mile Delivery Vans



## What's different about last-mile vans?

### If EVs are not purpose-built they are less efficient

- One issue with a lot of current electric van designs is that they were not purpose-built as EVs. Instead, many big OEMs take an existing gasoline van design, and convert it to an electric powertrain. While this does eliminate operating emissions, it is a suboptimal solution for lots of reasons. One of the biggest of these reasons is space. If an EV is based on a gasoline design, the motor and batteries will usually be slotted where the old internal combustion engine used to be. This takes up far more vehicle space than the efficient designs which are possible in purpose-built EVs—such as the Zevo—where the battery and motors tend to be housed elsewhere more compactly—often in the chassis as part of a 'skateboard' architecture. According to [specialist commercial vehicle](#) market research agency Interact Analysis, The result is that a purpose-built van will usually have a higher cargo capacity, and the driver will be moved higher and further forward which can also improve safety.

**Fleet safety concerns** - According to publishing company JD Supra, [nearly 20% of U.S. workplace fatalities are delivery drivers](#). Though this statistic includes all delivery drivers, not just last-mile drivers, we think it's still really important. Why is the figure so high? Well, one reason may be that delivery vehicles (including last-mile vehicles) in the past were perhaps not always designed with quite as strong a focus on safety as would be expected today. These days, fleets are operating with a focus on protecting drivers first.

With such strong pressure to deliver packages fast, drivers often rush to make deliveries, which can open them up to safety risks. Sadly, if eCommerce companies do not modernize, the drivers are stuck in the middle. Such companies make the most out of what they have, for example with clever route planning, but this strategy can only work up to a point.

**With such strong pressure to deliver packages fast, drivers often rush to make deliveries, which can open them up to safety risks.**

One way to address safety is to ensure that your last-mile fleet has market leading safety features designed to protect both drivers and pedestrians, as well as ensuring that you buy purpose-built vans that can help alleviate some of that pressure on drivers without losing overall efficiency on your delivery rounds.

**Delivery vans often are not environmentally-friendly** - As we see a rapidly growing number of delivery vans on our residential streets, their tailpipe emissions are becoming an ever more salient issue. Some reports suggest that getting packages to their destinations is contributing [up to 15% of CO2 emissions](#) from road transport in the USA each year. We believe the best solution is full electrification.

## Meet BrightDrop's Zevo - our electric delivery van

BrightDrop's Zevo vans are designed with the last-mile driver specifically in mind. Close attention has been paid to driver routine, with low step-in heights for ease of vehicle access, and with the maximum possible cab space, ensuring that there's plenty of room to traverse easily from the driver seat to the bulkhead door, and then out of the curb side door. By opening up that triangular area, we can provide more room to move, meaning that getting packages in and out of the vehicle is now easier.

Zevo also has segment leading safety features<sup>4</sup>. These are the result of being able to benefit from over a hundred years of automotive expertise from GM. Features such as Front Pedestrian Braking and Rear Cross Traffic Braking help protect the safety of pedestrians and passing vehicles. A range of features have been installed to improve parking safety—not a small consideration when considering last-mile vans that alternate between driving and parking all day long. These features include Front and Rear Park Assist and an HD Rear Vision Camera. The Zevo is also designed with a focus on safety on the open road too, with everything from a Following Distance Indicator to a Lane Keep Assist with Lane Departure Warning system as standard. Again, the intelligent BrightDrop Core software interface is crucial because it connects the Zevo vans into the wider BrightDrop last-mile ecosystem.



A decorative graphic consisting of a thick, light blue path that starts at the top left, curves down and right, then curves down and left, ending at the bottom left. Two white spheres with a blue gradient are placed on the path: one on the upper right curve and one on the lower left curve.

PART THREE

# Connected fleet management software

## It's all connected

To achieve maximum organizational efficiency, modern last-mile fleets should be underpinned by a connected fleet management software platform. BrightDrop Core software uses data directly from BrightDrop products to deliver a stream of nearly real-time, actionable insights to employees and managers. The best software platforms have three distinct (but related) capabilities: fleet monitoring, connecting all fleet touchpoints, and managing diagnostics. The BrightDrop Core software platform delivers all these capabilities and more.

**Insights into fleet status & monitoring** - Nearly real-time insights into fleet status give visibility of every Zevo and Trace in the fleet. This means managers can see the charging status of each BrightDrop vehicle and eCart in order to optimize energy management and help ensure that charging is performed in a cost-effective manner. Beyond charging updates, the software helps keep managers aware of the location of all assets, and allows for remote locking and unlocking of the BrightDrop Trace eCarts to help ensure that only the correct people have access. Additionally, BrightDrop Core software also delivers end-to-end chain of custody tracking of individuals who access the contents of the Trace, and the solution is customizable meaning that individual companies can adapt it to best suit their existing workflows.

**Connecting electric products** - The fact that all vans and eCarts are connected also gives the possibility for a deeper level of insight for fleet managers. First, connecting every fleet touchpoint allows managers to better plan the movements of

the fleet in a more efficient manner. Second, the software gives BrightDrop customers the option to store and analyze delivery data in nearly real-time. This brings the possibility of turning every delivery into a learning opportunity, allowing fleet managers access to data detailed enough to enable them to engage in continual delivery optimization.

Finally, connectivity enables the software to monitor every Zevo van and Trace eCart and provide diagnostic previews. With these insights fleet managers know where vehicles and orders are, and can help adjust delivery schedules if need be.

**This brings the possibility of turning every delivery into a learning opportunity, allowing fleet managers access to data detailed enough to enable them to engage in continual delivery optimization.**



PART FOUR

# Charging infrastructure, service, and support



## Getting you up and running

Last-mile fleet customers switching to electrified vans should give strong consideration to installing chargers at their depots. The reason for this is the specific nature of last-mile delivery runs. Last-mile delivery usually operates on a 'hub and spoke' model, where vehicle routes are the 'spokes' coming in and out of the 'hub' of the fulfillment center. The vast majority of these routes require far less than the full 250 mile range of BrightDrop's Zevo 600 van<sup>5</sup> before returning to the fulfillment center. This means that most last-mile drivers can recharge at the depot or delivery hub each evening, which is good news for fleets since many external public EV chargers are more expensive to use than privately owned chargers. However, it does mean that fleet managers must make provision for charger installation.

Delivery fleet operators hoping to accelerate their transition to all electric fleets will need to consider a variety of factors to ensure they can reliably charge their vehicles with minimum investment. BrightDrop and the trusted industry resources we can connect you with bring deep charging infrastructure expertise and are ready to support customers at every stage of the transition. Our commercial fleet services include comprehensive fleet modeling, energy optimization and ongoing support to help maximize ROI and reduce total cost of ownership. BrightDrop and those trusted industry resources also bring extensive experience to assist customers with all aspects of charging infrastructure planning, design and installation. This includes support for home charging and access to an extensive network of public charging stations.



When it comes to after-sales support and service, customers can depend on BrightDrop's authorized fleet service centers, genuine OEM service parts, and factory trained technicians to help ensure vehicles are well maintained—supporting both high-uptime and maximum service life. BrightDrop can also connect you with some of the best upfitters in the industry to customize your vehicles to suit your specific needs and even integrate out last-mile solutions into your legacy fleet vehicles.

<sup>5</sup>GM estimate based on a full charge and subject to change prior to production. GM Estimated range based on current capability of analytical projection consistent with SAE J1634 revision 2017 - MCT. Actual range will vary based on several factors, including temperature, terrain, battery age, loading, and how you use and maintain your vehicle.

## Conclusion – the importance of future-proofing

In an effort to avoid obsolescence, the BrightDrop ecosystem takes last-mile delivery to a whole new level, helping eCommerce fleets to lower labor costs, reduce tailpipe emissions and limit congestion on city streets. With BrightDrop, last-mile fleet managers have the freedom to choose the product best suited to the needs of the job.

The innovative BrightDrop ecosystem – from purpose-built electric vans, to two purpose-built Trace containerization solutions, to software that provides nearly real-time data about where a delivery is at any moment – are reinventing how goods are delivered. In a world with many challenges and choices in EV fleets, BrightDrop's holistic approach to the challenges and opportunities of delivering goods continues to offer solutions.

To learn more about our last-mile ecosystem, check out the [BrightDrop website](#), follow us on [LinkedIn](#), [Instagram](#), or [get in touch](#) today.