

ECO-MMERCE

HOW ONLINE RETAIL CAN BUILD THE SUSTAINABLE SUPPLY CHAIN OF TOMORROW

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ABOUT THE REPORT

Online retail sales reached new heights last year, as the coronavirus pandemic changed the way we shop. E-commerce's share of U.S. retail sales rose to 14% in the fourth quarter of 2020, from 11.3% a year earlier. ¹

When the pandemic hit, the shift from brick-andmortar to digital shopping had been underway for some time. The pandemic shifted this trend into overdrive as consumers increasingly went online to buy groceries, household staples, and other products that are traditionally bought in-store. They also went online to purchase bigger, bulkier products, like furniture and exercise equipment. Some changes in consumers' shopping habits may be longer lasting.

'The growth of e-commerce in the U.S. over the last two decades has had several effects on the supply chain. Among them:

- It has disrupted supply chains to favor warehouses over brick-and-mortar stores, which in turn precipitated a move from lessfrequent, full-truckload deliveries to morefrequent, less-than-full truckload deliveries.
- Rising consumer expectations for fast and free shipping have increased the need for smaller warehouses, more parcel distribution centers, and more freight transported by air.
- Demand for last-mile-delivery transportation has exploded.
- Supply chain services have moved significantly higher on retailers' agendas, as they have been challenged to build multichannel nodes into their existing networks, and as storage capacity has shifted (sometimes in full) from retail outlets to distribution centers.

These changes, in turn, all have had environmental effects, from land-use changes and more packaging to increased transportationrelated greenhouse gas emissions.

At a time when companies and investors are becoming increasingly focused on environmental, social and governance issues, they likewise feel a heightened sense of urgency around the environmental impacts of e-commerce. They have to turn fulfillment and delivery into an asset that is both strategic and sustainable.

The concept of sustainability can be traced back to Germany in the 18th century. In German, the term is Nachhaltigkeit, which means "sustained yield" and was applied in the context of forestry with the idea of never harvesting more than the forest can regenerate.

Given the challenges ahead in harvesting the benefits of the fast-growing e-commerce business in a sustainable way, this paper takes a closer look at some of the challenges the logistics industry faces in five key areas that are being transformed by online retail: last-mile delivery, first- and middle-mile delivery, warehousing, packaging, and returns. In each of these areas, it examines the ways in which e-commerce is actually having a net positive impact on the environment; where potentially negative effects are balanced out by natural offsets; and where further efforts are needed to address challenges. The aim is to provide practical insights that can help online retailers and their logistics partners better understand where to focus their attentions when targeting a sustainable e-commerce supply chain.

Data and information are drawn from a variety of sources, including the World Economic Forum, The MIT Center for Transportation and Logistics, CDP, and interviews with subject matter experts from DHL's U.S. business units (DHL eCommerce Solutions, DHL Express, and DHL Supply Chain).

LAST-MILE DELIVERY

With a click of a button, our groceries, clothes, household items, personal care items — just about anything — can arrive on our doorstep on the same day or the next day. The promise of swift delivery is made possible by highly efficient logistics networks that have rapidly adapted to the rise of business-to-consumer e-commerce.

The consumer appetite for convenience is reflected in the growth of last-mile delivery in North America. Before the pandemic, the market was expected to rise from an estimated \$31.25 billion in 2018, to nearly \$51 billion by 2022, an increase of more than 60%.² The spike in e-commerce last year will undoubtedly boost last-mile delivery's prospects.

ESTIMATED MARKET SIZE OF LAST-MILE DELIVERY IN NORTH AMERICA FROM 2018 TO 2022 (IN BILLION U.S. DOLLARS)



Source: https://www.statista.com/statistics/1040519/last-mile-delivery-market-size-north-america/

More packages, however, means more trucks and delivery vans on the roads, which raises environmental concerns. A recent report from the World Economic Forum argued that demand for last-mile delivery in the world's 100 largest cities would cause related emissions to rise by nearly one-third if the status quo remains.³

In the U.S., the transportation sector already accounted for the largest portion (28%) of total greenhouse gas emissions in 2018. Within transportation, light-duty vehicles (which includes passenger cars) and mediumand heavy-duty trucks were the biggest sources of emissions, responsible for 82% of the total. 4

To measure the total environmental impact of home delivery, though, one has to consider other factors besides the growth of delivery vehicles. Home delivery can replace personal car trips to stores. Amazon estimates that a single delivery van trip can take about 100 roundtrip car journeys off the road on average.

The U.S. Environmental Protection Agency also has analyzed this topic. In one scenario, 30 families order groceries online from the same store on the same day. They are flexible about delivery times, which allows the grocer to make all the deliveries in one trip. If the delivery truck gets 14 miles per gallon, the EPA found, in this example that online ordering could cut greenhouse gas emissions in half compared with each household driving to the store. A case study of grocery delivery by two researchers at the University of Washington came to a similar conclusion that a significant reduction of vehicle miles traveled, and thus carbon dioxide emissions, is possible when delivery service replaces car trips to the grocery store. ⁵ And a recent study by the MIT Real Estate Innovation Lab found online shopping generates 36% fewer emissions versus in-store shopping, even after factoring in higher returns and packaging, with the bulk of those emissions savings coming from transportation. ⁶ This figure will likely only increase as volumes — and therefore utilization and efficiency levels further grow.

Retailers and logistics companies are also taking direct steps to reduce the carbon footprint of their last-mile operations. One area that is receiving significant investment is electric vehicles.

DHL first deployed EVs in its U.S. delivery fleet in 2011 in New York. The company has since expanded its fleet to 200 vehicles and placed an order in March 2021 for an additional 89 for its operations in Los Angeles and New York. Globally, the company has committed to increase its fleet to 80,000 electric vehicles — 60% of the total fleet by 2030.

² https://www.statista.com/statistics/1040519/last-mile-delivery-market-size-north-america/

http://www3.weforum.org/docs/WEF_Future_of_the_last_mile_ecosystem.pdf

https://nepis.epa.gov/Exe/ZvPDF.cgi?Dockev=P100ZK4P.pdf

^{5&}lt;sup>https://tepis.epa.guv/zee/zyr=brugiruvcheg=1_xvears...pm https://scholar.google.com/scholar_lookup?hl=en&publication_year=2012&author=E.+Wygonik&author=A.+Goodchild&title=Evaluating+the+efficacy+of+shared-use+vehicles+for+reducing+green-</sup> house+gas+emissions%3A+a+U.S.+case+study+of+grocery+delivery

https://www.prologis.com/logistics-industry-research/logistics-real-estate-and-e-commerce-lower-carbon-footprint-retail

Although electric vehicles are more expensive up front, electricity is a cheaper fuel than gasoline or diesel. And as the U.S. electric grid becomes cleaner by incorporating more wind and solar power, the environmental benefits will grow.

One factor that has inhibited more aggressive deployment of electric vehicles has been the unstable production and aftermarket platform provided by startups in the space. What's exciting is that the growing demand from delivery fleets is bringing more established manufacturers to the market. Earlier this year, General Motors unveiled an electric delivery van with a 250-mile range. More innovation will bring down the cost of these vehicles, provide a more robust supply chain for delivery and maintenance support, and improve battery life — all of which have been big impediments to adoption.

Another significant roadblock is the lack of charging stations, not just on the road but also at fleet owners' facilities. The still-high cost of installing infrastructure and uncertainty around future needs for EVs also make it difficult for companies to predict electricity capacity requirements for new buildings. The success of EV-based transportation will depend on the collaboration of states, cities, utilities, and businesses to finance and build adequate infrastructure. Initiatives such as the Transportation Climate Initiative and CERES Commercial Electric Vehicle Alliance are examples of how public and private sector operators can come together to drive development in these areas.

In the meantime, fleet owners are recognizing there is unlikely to be a "silver bullet" solution that addresses all transport modes and markets with electrification, and there are still unknown factors and tradeoffs that need to be analyzed, such as the environmental impact of EV batteries over their entire life cycle, from sourcing to recycling/disposal. They are also incorporating alternative fuels like propane and biodiesel to reduce consumption of diesel. In dense urban areas, companies are testing cargo bikes and scooters to reduce traffic congestion on crowded streets. DHL has implemented a pilot in Miami, for example, with three-wheeled electric cargo bikes that can pull as much as 400 pounds.

In addition to increased market penetration of EVs and more eco-friendly transportation, logistics companies are promoting sustainable deliveries in other ways.

Other approaches that are in use today that save time and mileage over the last mile include:

- Deliveries that shift traffic to off-peak times and allow for the use of bigger trucks to reduce the number of trips.
- Route optimization that finds the best way to get from point to point and reduces dwell times at fulfillment centers.
- Load pooling that automatically matches the demand for capacity with available supply to maximize vehicle loads. McKinsey estimates at full potential, load pooling in urban areas could reduce delivery costs by up to 25% and vehicle emissions by up to 30%.⁷ This could potentially also include crowdsourcing via ridesharing and freight delivery platforms.
- Consolidated drop-off points at stores or parcel lockers where customers can pick up packages at any time, which also reduces the number of failed deliveries.
- Advances in autonomous vehicle solutions in which fuel efficiency increases when there is no human intervention. When paired with EV solutions, these types of deliveries could be extremely sustainable.



⁷<u>https://www.mckinsey.com/~/media/mckinsey/business%20functions/sustainability/our%20insights/urban%20commercial%20transport%20</u> and%20the%20future%20of%20mobility/an-integrated-perspective-on-the-future-of-mobility.pdf



The drop-off points, either stores or unmanned parcel lockers, could further develop into carrier-agnostic service structures closer to customers' home addresses. Thinking futuristically, these parcel stations could even conceivably be transformed into mobile and autonomous parcel-delivery robots — big enough to carry several parcels and small enough to pass through doors. Overall, the last mile is arguably the most critical aspect of the e-commerce supply chain when it comes to sustainability. While there is a credible argument that every delivery van takes multiple passenger vehicles off the road — and this positive effect gets amplified when cargo capacity is maximized — there are also opportunities to further drive down emissions in this area. Electrification of vehicles offers the most potential and needs to be a focus for e-commerce companies, logistics providers, federal and local government entities, urban planners, auto manufacturers, and other stakeholders.

SUMMARY: SUSTAINABILITY IN THE LAST-MILE

Net positive impacts of e-commerce on the environment

- Delivery vehicles replacing passenger car trips
- Introduction of electric vans and other "greening" of delivery fleets (e.g., alternative fuels and cargo bikes)

Challenges with neutral or positive offsetting factors

- More broadly distributed residential deliveries incentivizing companies to seek greater efficiencies (routing, consolidation/pooling, drop-off points)
- Higher risk of failed deliveries challenging companies to introduce more transparent tracking tools and more flexible delivery options
- Deliveries scheduled outside congestion times

がる Challenges that will depend on future developments (technology, policy, investment)

- Uptake of electric-vehicle technology (reduce cost to increase demand beyond tipping point for greater OEM investment)
- Insufficient charging infrastructure for EVs
- Global supply chain and resource availability and recovery for battery technology

Images: Flaticon.com

FIRST- AND MIDDLE-MILE DELIVERY

Retail and e-commerce companies have given plenty of attention to the last mile of their delivery services to make their overall shipping services faster and more sustainable. It could be argued that the first and socalled middle-mile logistics have been less radically transformed by e-commerce. (The middle mile is the part of the supply chain in which goods are shipped from warehouses or distribution centers to retail stores or fulfillment centers.)

But the demand for faster delivery — at least in a world where forecasting of inventory is still imperfect — is driving two trends that have sustainability implications. One is an increase in aviation, particularly in larger markets where goods have to be repositioned quickly over greater distances to meet demand. The other is the movement of distribution centers and fulfillment centers closer to consumers, which has changed trucking routes and increased demand for less-thantruckload shipments.

On the aviation front, companies are increasingly looking at the potential of sustainable aviation fuel. The biggest impediment is cost. Sustainable aviation fuel can be two to four times more expensive than traditional jet fuel. But airlines and logistics companies are finding opportunities to drive the transition and create more of a market for sustainable aviation fuels. United Airlines, for example, recently partnered with ten companies (including DHL, HP, Nike, and Siemens) to buy lowcarbon aviation fuel derived from waste to be used on flights this year. The project gives United a way to cover the higher costs and its customers a way to offset the environmental impact of flying. Aviation manufacturers are also seeing some progress in the development of fully electric-powered aircraft, particularly for shorterhaul routes, although this remains a longer-term proposition. A number of retailers — aided by tools from their logistics providers that provide transparency on the carbon footprint of their shipping options — are also taking measures to address this by proactively offering customers deferred or alternative transportation options with a lower impact on the environment at the purchase stage.

The change in trucking, while potentially creating additional inefficiencies with smaller loads traveling over larger distances, could actually create opportunities for greater utilization. A significant problem that has plagued the trucking sector in the past has been a lack of backhauls, meaning that trucks often return empty to their hubs. Greater demand in secondary or smaller markets and technology that can more efficiently match loads to trucks could create opportunities for more optimized routing and greater overall use of capacity. Another strategy for reducing fuel, emissions, and costs for the middle mile is switching from truckloads to rail. Rail is a slower mode of transportation, with intermodal facilities not always conveniently located, so this must be factored in when deployed as part of an e-commerce fulfillment strategy. However, rail can be highly effective in reducing emissions while still maintaining service levels when used, for example, as a mid-supply chain strategy to inject product from global manufacturing sites into local distribution networks.

While battery technology and range are even more significant challenges for heavier-duty trucks operating over longer distances, several manufacturers are actively working to address this potential market. Daimler Trucks North America, for instance, will start production next year of its first all-electric heavy-duty truck, which has a range of 250 miles and will be suited for middle-mile logistics. Greater overall demand for trucking services could help to accelerate demand in this area.

SUMMARY: SUSTAINABILITY IN THE FIRST AND MIDDLE MILE

Positive impacts of

e-commerce on the environment

• Accelerated investment in sustainable aviation fuels and electrification

Challenges with positive offsetting factors

- Greater demand to/from smaller markets creating opportunities for increased utilization of trucking capacity
- Growth in parcel volumes allows freight movements to be aggregated into an optimized network

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Challenges that will depend on future developments

(technology, policy, investment)

- Insufficient charging
 infrastructure for EVs
- Lack of long-range battery technology for trucks
- Development of clean fuel technology for aviation

Images: Flaticon.com

WAREHOUSING

Despite the attention paid to transportation modes, the key to speedy delivery actually lies in the warehouse. Same-day and next-day delivery requirements are driving a shift to smaller warehouses and fulfillment centers that hold inventory closer to the consumer. As warehouses are an essential part of global supply chains, there is a growing effort to study and reduce the carbon footprint of logistics activities in these facilities to achieve a longterm sustainable business practice.

Warehouses impact the environment in multiple ways.

At the most basic level, they consume energy. Operating highly technological warehouses consumes a significant amount of energy due to lighting, heating, cooling, and material handling. One of the basic strategies used to manage emissions created from electricity consumption is to buy renewable energy certificates. The certificates support renewable electricity development. DHL, for instance, purchases RECs from wind farms to offset 100% of its U.S. electricity consumption. This shift to renewable energy will be strengthened in the future as technology develops and costs come down, enabling companies to incorporate renewable generation and power storage via batteries directly into their distribution center, or use innovative solar models such as power purchasing agreements or virtual power purchasing agreements. Companies are also taking more direct steps to reduce the carbon footprint of warehouses. They partner with real estate developers to build facilities certified by third parties (e.g. LEED, WELL), which are designed to minimize emissions, energy, and water use. Such buildings usually have more efficient heating and cooling systems, extra layers of insulation, and water-saving plumbing fixtures. They also use LEDs for lighting, which use 75% to 80% less energy than traditional incandescent bulbs.

Beyond the direct energy consumption of the warehouse, its operations — particularly material-handling equipment - also create emissions. To improve the environmental performance within the warehouses, logistics companies are increasingly turning to environmentally friendly material-handling technology, such as forklifts with newer, more efficient batteries and chargers. Companies are also increasing the productivity of their warehouses by optimizing, automating, and integrating the flow of materials and increasing the speed of loading trucks and delivery vehicles. This also helps to reduce dwell time of trucks at distribution centers and other facilities, reducing their emissions. The automation of warehouse processes makes it possible to reduce lighting use altogether, either by eliminating lighting in fully automated locations or using controls and sensors to configure systems to operate only when spaces are occupied and not exposed to natural daylight.



One of the biggest technologies transforming warehouses is autonomous mobile robots. These robots, for example, can quickly locate and transport items to workers who pick customer orders. Retailers and thirdparty logistics operators are expanding their use to drive speed and efficiency in their operations. Robots also help the environment, allowing better space usage and higher throughput of shipments, which can reduce the overall footprint of warehouses in supply chains. In turn, the expansion of electric-powered facilities and equipment will increase the importance of renewable energy generation and help drive investment in greener national grid systems. Similar to the last-mile dynamic of delivery vehicles taking passenger traffic off the roads, there is also a natural offsetting factor when it comes to warehouses. While the need to be closer to customers creates the need for smaller distributed facilities — rather than larger, arguably more efficient, centralized warehouses — the growth of e-commerce is also reducing the energy consumption of extensive retail networks. Retailers are increasing the efficiency of their stores by using them as delivery and return hubs or moving sales online altogether.

SUMMARY: SUSTAINABILITY IN THE WAREHOUSE

Positive impacts of e-commerce on the environment

- Increased automation in e-commerce operations providing more throughput and productivity (meaning greater efficiency of each site)
- Use of greener energy supply in newer facilities
- Advances in electric materialhandling equipment

Challenges with positive offsetting factors

- Increased number of warehouse facilities offset by decreased retail infrastructure
- Locating inventory closer to consumers creates more last-mile moves but reduces aggregate transportation

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Challenges that will depend on future developments

(technology, policy, investment)

- Utility-scale solar and cleaner energy plants that feed into electric grid
- More energy-efficient cement and construction materials

Images: Flaticon.com

PACKAGING

Reducing waste is also a key initiative within e-commerce supply chains, with much of the focus on packaging. Sustainable packaging is not a trend. It's a consumer expectation, and the packaging community has ramped up its commitment to making products more eco-friendly. Leading consumer brands have several initiatives underway to minimize the weight and volume of their products' labeling and packaging, including recycling, use of renewable materials, reuse, and responsible fiber sourcing.

One interesting model, which was unveiled at the World Economic Forum in 2019, involves a new system of high-quality packaging that can be returned and refilled again and again. ⁸ Logistics plays an important role in the emerging reuse trend in e-commerce. Someone has to pick up the empty containers and wash, refill and restock them for delivery to another customer. E-commerce has thus led to innovations in reverse logistics. The sector could also further benefit from looking at some of the efficient supply chain practices that have already been established in industries such as automotive, which has pioneered packaging innovations such as reusable cages, totes, and even traceable plastic pallets to reduce costs and achieve efficient material sourcing for a number of years. The drive to minimize packaging material has always been top-of-mind for retailers and logistics providers. Reducing the weight of parcels and loading more of them on trucks naturally saves money and boosts efficiency. In what is a real-life game of Tetris, transportation providers such as DHL use sophisticated software systems to determine the box size that should be used based on the variability of products being picked and the available transport capacity.⁹

But consumer concern about the environmental impact of all that cardboard and plastic has pressured the retail industry and its partners to also address the cause rather than the symptoms. Companies are seeking to come up with more innovative solutions: plastic pouches made from recyclable materials; rightsized cardboard boxes that use less materials; or, in the most ambitious cases, the total elimination of plastic materials, including labels, tape, pouches, and void fill. The algorithms to create customized boxes are continuously improving, and some retailers with packaging operations embedded within their warehouses are increasingly able to produce diverse packaging options that provide a more optimal fit for their products.



8 https://loopstore.com/ 9 https://www.supplychaindive.com/news/dhl-carton-utilization-set-optimization-research-warehouse-box-shipping-cost-ecommerce-order/593164/ The desire for more eco-friendly packaging also extends to the materials stuffed inside the boxes to prevent damage. Companies are looking more holistically at this, balancing the need to ensure their products' integrity during transport with reducing waste. Many shippers have already phased out packing peanuts, as Styrofoam is notoriously difficult to recycle, and replaced them with plastic bags filled with air. Most air pillows are made from recyclable plastic and can be recycled along with plastic grocery shopping bags. Incorporating recycling or reuse of materials into their end-to-end supply chain is also a key priority. Warehouses, for example, are shredding more of their post-industrial waste to reuse as filler in boxes. At an operational level, companies are also looking to embed packaging operations directly into their distribution facilities where possible. This can reduce transportation movements, further limiting emissions. Delivery companies are also looking at innovative approaches during the transportation process, such as the "naked packaging" concept, where the driver removes the outer packaging at the point of delivery and retains it for reuse with future shipments.

Retailers and logistics companies are accelerating the scale of recycling and sustainable packaging in their e-commerce operations. Containers and packaging make up a major portion of municipal solid waste in the U.S., amounting to 82.2 million tons in 2018, according to the most recent data from the EPA. At the same time, thanks in part to the growing use of recycled materials, the recycling rate of packaging and containers was 53.9%, up from 49.4% in 2017. ¹⁰ The advancement of the sustainability footprint of e-commerce packaging is largely going to depend on two issues: increasing the supply and cost competitiveness of sustainable base materials for packaging, and further optimization of the process to minimize inefficiencies in packaging size as much as possible. Packaging systems must be designed with care, using the least amount of materials and energy, maximizing recycled content, and increasing the potential for reuse.

SUMMARY: SUSTAINABILITY IN PACKAGING

Positive impacts of e-commerce on the environment

- More creative and circular solutions from innovative retailers (i.e. refill options, recycling, shredding of materials for fillers)
- Right-sizing and optimization of packages reducing materials and transport costs
- Embedding of packaging operations within e-commerce fulfillment centers reducing transportation movements

Challenges with positive offsetting factors

Increased use of recyclable materials leads to the need for more recycling by retailers and consumers

X

Challenges that will depend on future developments

(technology, policy, investment)

- Overall higher volume of packaging materials and fillers versus traditional retail (more robust materials needed for transportation process)
- Prohibitive costs and limited availability of sustainable packaging materials

RETURNS

Returns have always plagued online retailers. Free shipping and lenient return policies practically invite shoppers to buy multiple sizes and colors and return what they don't want. On average, e-commerce return rates are three times higher than those of physical stores.

The surge in online shopping last year is believed to have escalated e-commerce returns, according to media reports. ¹¹ A consumer survey last year found that clothing and shoes were the most common items returned. ¹² Returns to stores naturally went down, while overall returns of e-commerce orders went up, although this was partially offset by changes in product categories. Leisurewear sales, for example, grew during the pandemic, with the additional (most likely unforeseen) effect that more elasticized clothing provided a better fit and returns based on size went down.

Returns are a drain on retail bottom lines. In 2019, one estimate pegged return delivery costs to hit \$550 billion in 2020, an increase of 57% from 2017. ¹³ In addition to delivery costs, there are expenses associated with processing returns and restocking items.

There are also environmental costs for returns, from the additional package movements to the need for more warehouse space. Retailers have traditionally relied on liquidators to dispose of returned inventory. Liquidators sell goods to middlemen, such as wholesalers and resellers, who often transport goods in less-than-full truckloads before they are finally resold to another consumer. All these shipments create emissions — 16 million metric tons a year, according to one estimate. 14

Returns are also a significant source of waste. About 5.8 billion pounds of returns end up in landfills. ¹⁵

In the face of the large and growing challenge to better manage returns, savvy retailers are turning to technology to improve their reverse supply chain network and enable a more circular economy. They are using software that incorporates data analytics and real-time secondary market information to find the optimal path for return inventory. Algorithms that incorporate point-of-sale data predict the new selling price and its optimal path, which could be direct to consumer, business to business, recycling, or return to manufacturer. Another route that retailers are increasingly using to minimize waste from returns is to donate them to charity.

RETURNS OF ONLINE PURCHASES BY CATEGORY IN THE U.S. IN 2020



WHICH OF THESE KINDS OF ARTICLES HAVE YOU SENT BACK AFTER AN ONLINE ORDER IN THE PAST 12 MONTHS?

Source: https://www.statista.com/forecasts/997235/returns-of-online-purchases-by-category-in-the-us

11 https://info.optoro.com/hubfs/The%20Optoro%202020%20Impact%20Report.pdf

12 https://www.statista.com/forecasts/997235/returns-of-online-purchases-by-category-in-the-us 13 https://www.statista.com/statistics/871365/reverse-logistics-cost-united-states/

14

15 https://info.optoro.com/hubfs/The%200ptoro%202020%20Impact%20Report.pdf

Online retailers also are trying other approaches to streamline the logistics of returns. Some are allowing customers to drop off returns at unaffiliated brick-andmortar locations, no box or shipping label required. The environmental benefit comes from having the brick-and-mortar retailer consolidate returns into one large shipment to a warehouse instead of several small packages being shipped to warehouses. Other approaches include consolidating return centers with distribution centers to allow the quick return of products to inventory that can be placed on the market again, or logistics providers consolidating damaged, offseason, or returned inventory for more efficient end-oflife solutions.

While e-commerce is associated with a higher level of returns, more sophisticated sales interfaces, data analytics and other technologies can help to reduce the overall level of returns, while optimized transportation and recycling solutions can reduce emissions. There is a growing number of logistics companies specializing in e-commerce returns solutions and reverse logistics. This points both to the demand in this space as well as the potential for further innovation in the future. As these companies bring more structure to the process, there will be opportunities to develop more systematic circular economy solutions that further mitigate the impact of returns on the environment.

SUMMARY: SUSTAINABILITY IN RETURNS

last-mile delivery networks

ക **Positive impacts of Challenges with positive** Challenges that will depend e-commerce on the offsetting factors on future developments environment (technology, policy, investment) **Uncompetitive costs** of returns forcing Increased efficiency of Waste from disposals retailers to explore circular transportation by utilizing Higher rate of returns economy solutions more backload capacity in (and transportation (reusing, repurposing,

reselling goods closer to

the final delivery point)

movements) from online orders versus traditional retail

CONCLUSION

Sustainable e-commerce is not any oxymoron. Independent research shows online shopping can be greener than traditional retail, but it's a complex issue, with no single solution. Multiple stakeholders need to be involved to share the responsibility, including consumers.

E-commerce has disrupted the entire supply chain, from the first mile to the last, from distribution location strategy to the cardboard box your order arrives in. Sustainable strategies today are focused on the three Es of energy, efficiency, and eco-friendly materials. Advances in alternative fuels and electric vehicles are reducing the carbon footprint of transportation. Companies are deploying software to consolidate orders, optimize route planning and truck capacity, and maximize the productivity of logistics networks. Retailers are working with their logistics and packaging partners to not only reduce the amount of materials used in shipping, but also reuse and recycle those materials.

The rapid growth of e-commerce during the coronavirus pandemic, though, will require more attention on sustainable solutions. A combination of regulation and incentives, consumer activism, corporate leadership, and innovation is needed to achieve a truly sustainable supply chain.

A new generation of sustainability is unfolding, and forward-thinking retailers, logistics partners, and other stakeholders are working together to own the future.





DHL is the leading global brand in the logistics industry. Our DHL divisions offer an unrivalled portfolio of logistics services ranging from national and international parcel delivery, e-commerce shipping and fulfillment solutions, international express, road, air and ocean transport to industrial supply chain management. With about 380,000 employees in more than 220 countries and territories worldwide, DHL connects people and businesses securely and reliably, enabling global sustainable trade flows. With specialized solutions for growth markets and industries including technology, life sciences and healthcare, engineering, manufacturing & energy, automobility and retail, DHL is decisively positioned as "The logistics company for the world."

DHL is part of Deutsche Post DHL Group. With sustainable business practices and a commitment to society and the environment, the Group makes a positive contribution to the world. Deutsche Post DHL Group aims to achieve zeroemissions logistics by 2050.