

Contents

Executive Summary	3
Introduction: a time of change	4
Key Logistics Trends	5
Accelerated e-commerce growth	6
Changing consumer attitudes	7
Changing expectations of the public realm	8
Concerns for Modern Logistics	10
The climate crisis	11
Packaging waste	12
Enabling the circular economy	14
Accidents, noise and air pollution	15
A Better Future for Urban Logistics	16
The last mile	17
E-cargo bikes and freight pipelines	18
New spaces and infrastructure	19
Data-driven insight	20
Decarbonising our roads	21
Conclusion	22

Executive Summary

One of the most significant changes in the urban landscape of recent years has been the boom in urban logistics. Roads in our cities, around warehouses, major arteries and residential streets are now heavily trafficked with arrays of HGVs, delivery vans and cars, scooters, bicycles and other vehicles constantly moving goods or food around. This use of the urban space would have been almost unimaginable 20 years ago.

This industry, largely driven by the emergence of e-commerce, has transformed how, when and by whom roads, pavements and transport infrastructure are used. This change has, in many ways been positive, but it has also led to a range of undesirable side effects.

This report is intended to help delivery companies, urban planners, cities and the wider supply chain to understand the trends that are influencing urban logistics, along with the problems they are causing. The report then investigates some of the potential future directions for urban logistics which could help to make the industry more sustainable, efficient, and conducive to liveable and healthy cities.

This report advocates for the logistics industry to find new ways of delivering goods that don't impinge on the health, social and environmental needs of urban citizens. The industry cannot be expected to do this without a clear and transparent regulatory framework. National governments and city leaders play a pivotal role here, as they can set targets, provide incentives and manage firms that do not behave responsibly.

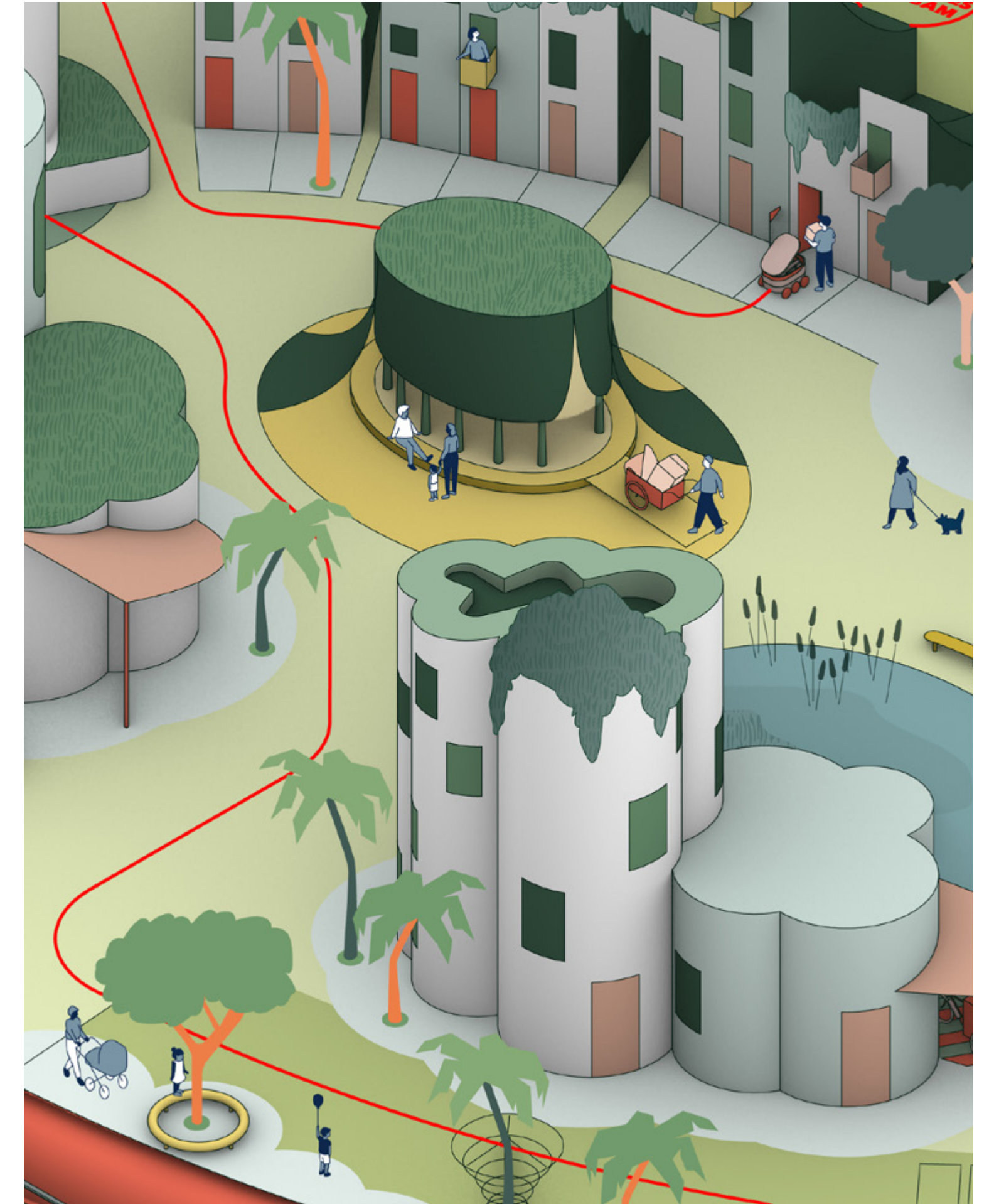
Masterplanners and urban designers should change and adapt to new ways of forming our public realm. The desire to utilise new technology or consolidate everything needs to be balanced with construction, carbon and operational costs.

Innovation and automation must be encouraged whilst retaining great placemaking and connectivity.

By working together, all stakeholders can foster a vibrant economy while also ensuring that the urban space is well managed and accessible to all.

This report covers urban logistics, including last-mile delivery, against a backdrop of the Covid-19 pandemic and a worsening climate crisis. We have looked at the UK specifically, although many of the insights and solutions explored here are relevant to other many other regions.

By working together, the logistics industry and city governments can foster a vibrant economy while also ensuring that the urban space is well managed and accessible to all.



Introduction: a time of change

Cities around the world are grappling with a series of rapid and unprecedented transformations in the movement of people, goods and vehicles across the urban space. These changes have been building over a number of years, but accelerated rapidly during the COVID-19 pandemic.

The most immediate driver of change was, of course, lockdowns and their associated restrictions on movement. Lockdowns meant many products and services could only be bought online, and this sped up (pre-existing) trends in e-commerce which affect how and where goods are delivered. At the same time, millions of citizens began working from home, radically altering transport and infrastructure requirements.

More broadly, complex supply chains have been disrupted by a range of factors. These include border closures, labour constraints, energy price

spikes, shortages of products or component parts, stockpiling and 'black swan' events like the Suez Canal blockage in March 2021. This confluence of factors has highlighted inherent weaknesses in existing supply chains, driven by an over-reliance on a single node of operation and Just-in-Time (JIT) business models.

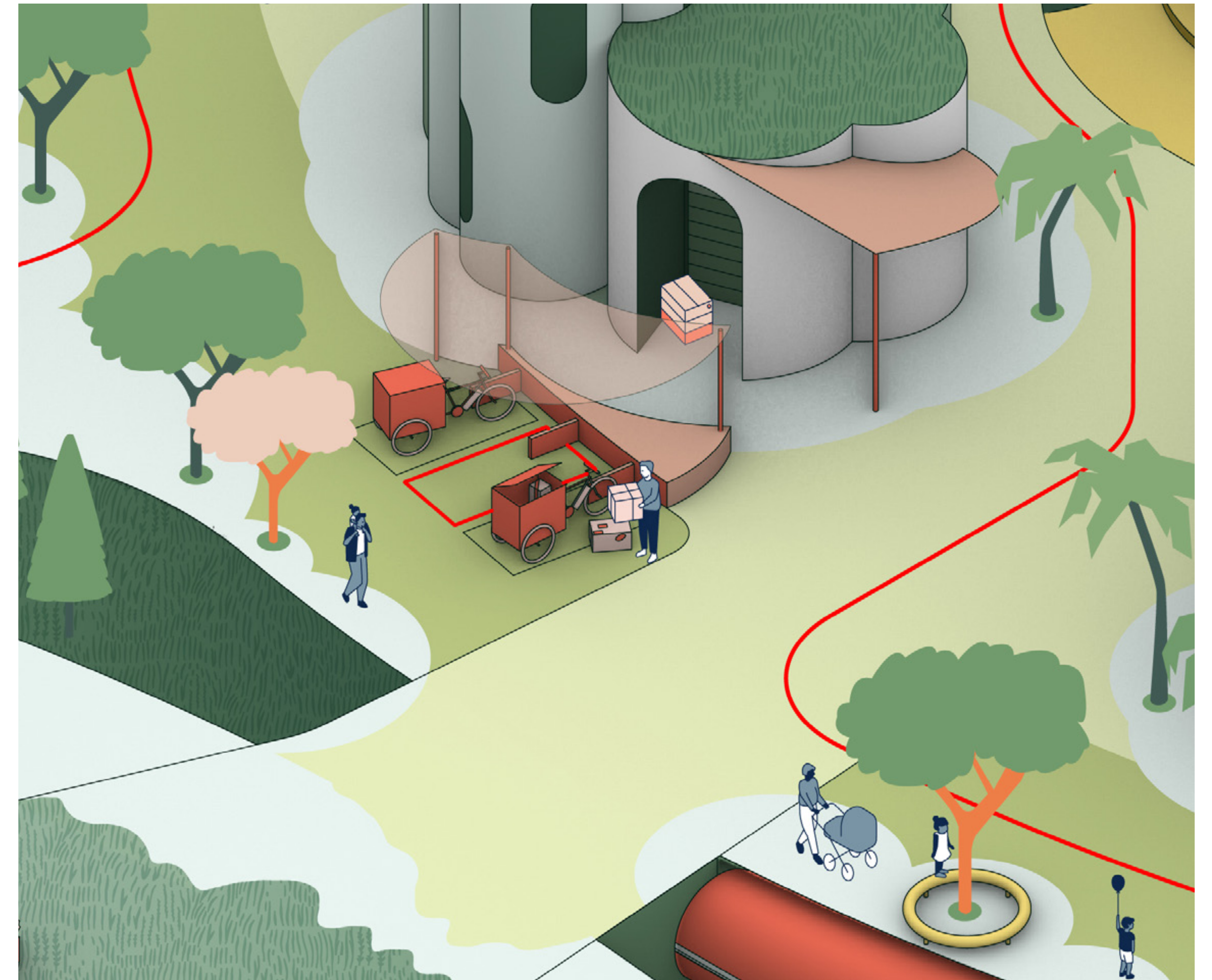
To adapt to these changes in the movement of people and products, cities have begun re-evaluating the relationship between logistics, infrastructure, their communities, and the environment. Progressive town planning and policy-making will need to promote the efficient, sustainable movement of goods whilst also enhancing the urban realm, community, health and wellbeing.

The logistics industry, meanwhile, has a major impact on the environment and is a heavy user of urban infrastructure. Carbon emissions, worsening congestion, poor air

quality and noise pollution are just some of the issues that need to be addressed head-on by the industry as societies attempt to progress towards Net Zero.

This report sets out some of the changes in urban freight transport and logistics against a backdrop of the COVID-19 pandemic and a worsening climate crisis. We begin with an analysis of the drivers of change, before investigating major challenges and the future of urban logistics.

Progressive town planning and policy-making will need to promote the efficient, sustainable movement of goods whilst also enhancing the urban realm, community, health and wellbeing.



Key Logistics Trends

In this chapter, we summarise some of the key trends in urban logistics to explore what is changing and why.



Accelerated e-commerce growth

The COVID-19 pandemic and its associated lockdowns rapidly accelerated the pre-existing trend towards online shopping. The number of e-commerce transactions in 2024 is expected to be five times higher than in 2014, accounting for 22% of all retail transactions globally.¹ Besides the established e-commerce giants, more product lines and retailers are now offering home delivery, from cars (Cazoo and Cinch) to corner shops (Getir, Gorillaz and Hello Fresh).

Consequently, the number of delivery vehicles on the roads of the 100 most significant global cities is expected to increase by 36% from 2019 to 2030.²

Light Goods Vehicles (LGVs) have already been the fastest growing source of road transport demand in the UK, with a 180% increase in van registrations since 1995. Van kilometres travelled have risen by 67% in the last two decades.³

While e-commerce gives consumers an extraordinary level of convenience, the way it currently works raises several key challenges.

E-commerce logistics produce several problems, not least urban congestion. Vans often operate at part load or are driven empty. Estimates from 2015 place empty miles in the 20%-30%+ range. According to the UK government Department for Transport (DfT), HGVs covered 16 billion miles on the UK road network in 2014 and 29% of those miles were empty trucks. Reducing this back to the 2001 level of 26% alone would equate to saving 480 million miles, 720 million tonnes of CO₂, and allow for £340 million in fuel savings.⁵ Many of these vehicles run on petrol and diesel, thereby contributing to air pollution.

Logistics innovators are now utilising routing and scheduling optimisation software which generates optimal route plans, including

movements to and from different depots to reduce ‘empty miles.’ One case study demonstrated £250,000 of savings in just one region.⁶

Efficiencies are also being found in reverse logistics, utilising empty capacity. In a collaboration between the global logistics company DHL and pub-chain JD Wetherspoon, roll cages containing food and drink supplies for pubs are delivered daily by DHL, which are then filled with waste and backhauled for processing and sorting. This has resulted in a marked increase in recycling rates, reduced carbon emissions and cost savings.⁷

The number of delivery vehicles on the road is expected to increase by 36% from 2019 to 2030.

World Economic Forum

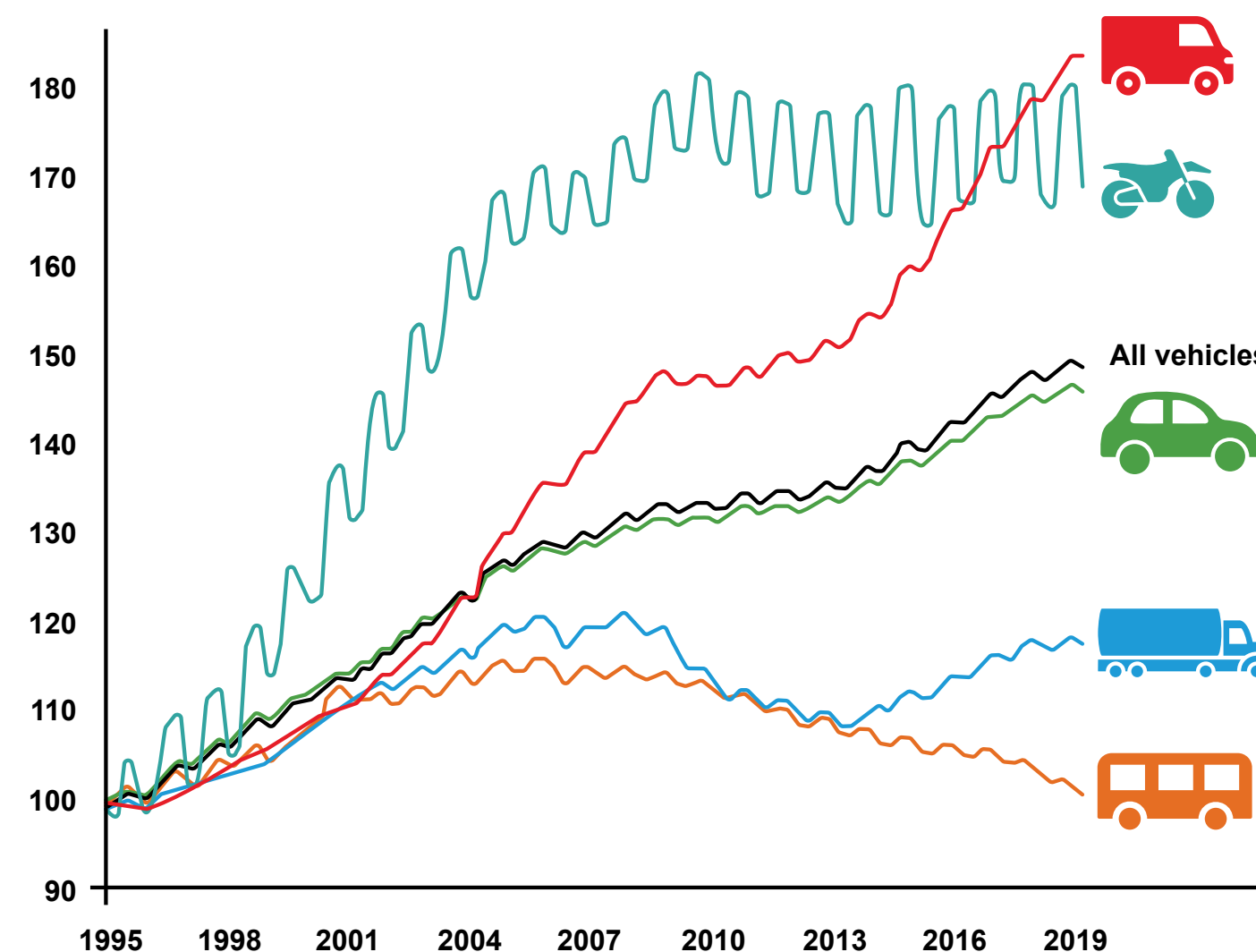


Fig.1. Index of Licensed Vehicles by Vehicle Type (DfT Transport Statistics 2019) ⁴

Changing consumer attitudes

Even before the COVID-19 pandemic, consumers had come to expect quick, convenient, and often free delivery as standard. Research reveals that 66% of millennials routinely look for one-hour delivery options and the ‘Amazon effect’ has led to more consumers expecting free delivery. Looking ahead, same-day or instant delivery is expected to grow by 20-25%.⁸

Although rapid delivery pleases customers, a 2018 study found that faster shipping options typically require three times the energy of slower delivery processes, and that these ‘instant’ options have a higher carbon footprint than traditional retail and online shopping.

Some consumers are becoming much more aware of issues relating to sustainability, and one survey found that 62% of young consumers in the UK favoured brands that were more transparent about their environmental impact.⁹ Certain service providers are trying to do more to reduce inefficiencies and promote cleaner, greener alternatives – indeed, one recent study found that 56% of retailers and logistics providers rate sustainability as the most important area of last mile delivery.¹⁰ That said, the same study found that only 14% of consumers rated ‘sustainable delivery’ as important.

Part of the solution could be in the way delivery is framed on e-commerce websites. MIT’s ‘Green Button Project’ sought to better understand whether consumer behaviour could be influenced by giving them information about how their delivery options impact the environment. The study, conducted with Mexico’s largest retailer, found that 30% of consumers initially unwilling to defer delivery would choose to wait longer when presented with data about fast delivery’s environmental impact.¹¹

Meanwhile, business customers with ambitions to become more sustainable are looking to procure more goods through nominated carrier schemes (NCS). NCS involve local businesses agreeing collectively to the use of a single company for the delivery of certain types of goods. Nominating a shared courier, to be used by a collective, reduces the number of courier trips to high streets, business parks and other centres of consumption.

30%

of customers at Mexico’s largest retailer would choose to wait longer when presented with environmental impact data around fast delivery



Changing expectations of the public realm

COVID-19 has highlighted the importance of community and the quality of one's immediate neighbourhood. With a significant number of people working from home, urban-dwellers have found a new appreciation for their neighbourhoods and experienced a closer connection to their community.

The idea of a '15-minute city', first mooted by the academic Carlos Moreno and popularised by Paris mayor Anne Hidalgo, looks at ensuring local access to a wide range of essential goods and services - the idea being that these are accessible within 15 minutes of a resident's home, either by foot, bike or public transport.

Changing spatial demands, building regulations, zoning and planning policy could help facilitate this move towards increased localism, with an improved high street offer and more mixed-use and amenities. Existing towns and new development masterplans have to grapple with the tension between facilitating convenient and safe access for deliveries whilst ensuring that the streets encourage active travel by walking and cycling and easy access to public transport.

In our cities, discussions around whether to accept deliveries on street or whether to build off-street service areas are common, and there are often calls for consolidation of goods to reduce vehicle numbers at delivery points. In relation to consolidation, decision makers need to consider the service charge implications on affordability and balance this with the likely reduction in vehicle movements and whether the benefit, in terms of reduced conflicts and amenity, is justified. Off street servicing may be justified on a busy street, but where the street is lightly used the benefit of removing servicing from the street needs to be set against the costs of creating undercroft service areas and podium decks.

This cost includes construction, carbon and operational costs. Podiums also change levels and can reduce permeability and connectivity of building blocks.

Delivering successful streets that encourage active travel, safety and a high-quality public realm is an aspiration for developers and public authorities alike. Within London, the Healthy Streets Approach provides a framework to bring about positive changes to the character and use of the city's streets by increasing space, greening and reducing air pollution. It has 10 main indicators which can be used as a measure of how 'healthy' a street is. Considering these alongside the impacts and opportunities of logistics is increasingly important.

The right urban logistics strategies should complement a city and deliver better services in a more sustainable way. There is not a one size fits all approach but instead solutions that deliver specific outcomes embedded in the fabric of the city.



Fig.2.
The Healthy Streets Approach



Liverpool's Bold Street

Liverpool's Bold Street has seen changing spatial demands over the pandemic, moving towards increased localism, with an improved high street offer.



Alfred Place

Alfred Place in London where loading bays in a widened area give space for controlled access in a scheme of regenerative urban greening.



Concerns for modern logistics

Despite its convenience for consumers, modern urban logistics leads to significant issues for cities, towns, infrastructure and communities. In this chapter, we look into these issues and how they could be addressed.

The climate crisis

The transport sector is responsible for the largest single proportion of UK emissions, at 27% of the total. Much of this comes from private cars, but goods vehicles represent a growing proportion of that total. To achieve Net Zero, moving away from fossil fuel-powered vehicles will be vital. However, the pandemic-driven boom in online shopping has led to more vehicles on roads, more deliveries and more stops. This rapid growth has had a detrimental impact on the carbon reduction efforts of e-commerce and the logistics industry that underpins and enables it.

What is more, as the climate becomes more volatile, weather is causing disruption to roads and rail services on an increasingly frequent basis. The resilience of transport and logistics infrastructure will be further tested as global temperatures continue to rise. Adaptation will become more important as weather patterns continue to evolve.

A range of measures have already been introduced to encourage the transition to Net Zero in the transportation sector. Road charging, congestion zones and Low Emissions Zones are just some of the initiatives we've seen introduced in cities globally.

But more could be done. In 2022 only around 22% of global emissions were subject to a carbon pricing scheme.¹² Looking ahead we will likely see increased fuel taxation on vehicles that run on petrol or diesel, and ultimately, the phasing out of all such vehicles.

Devolution in the UK and the subsequent gain in mayoral power will allow for more localised, context-specific solutions to the climate crisis. Private sector firms will be expected to follow local mandates in the cities in which they operate, possibly before these are enforced at a national level.

The logistics industry and fleet owners need to anticipate and plan for increasingly stringent environmental regulation and legislation going forward, which will not only seek to reduce emissions from individual vehicles but also reduce the number of vehicles in use.

**To achieve Net Zero,
moving away from fossil
fuel-powered vehicles
will be vital.**



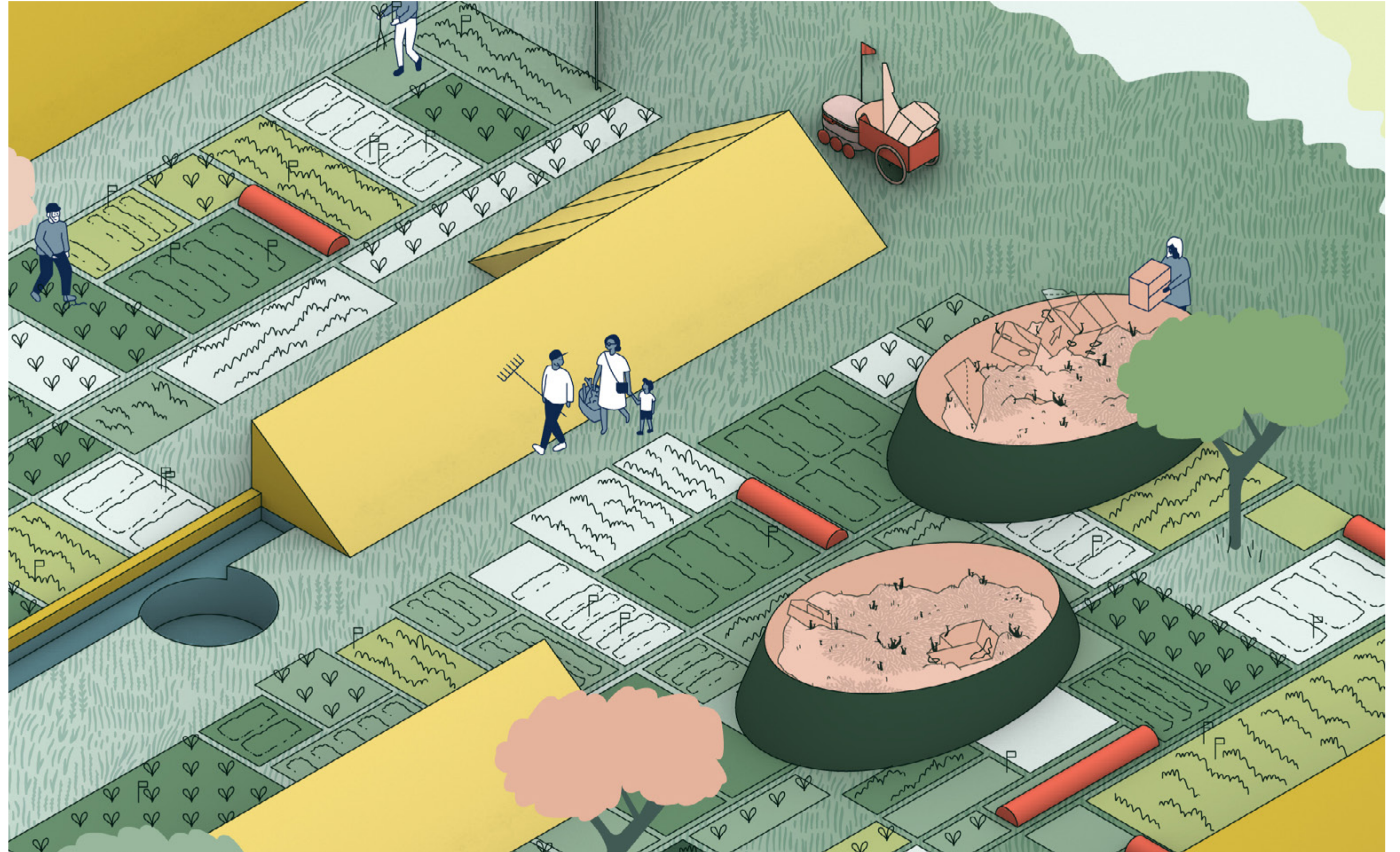
Packaging waste

Retailers, suppliers and logistics companies are the source of large quantities of waste, driven by a need to package products to avoid damage during travel. Governments are taking notice and are pushing the industry to reduce the amount of packaging used, minimise waste and phase out unsustainable, non-recyclable materials.

Circular economy principles will surely play a significant role here. Research by waste management company Biffa has identified a 'Closed Loop' method as a potential solution - a process where unwanted material is recovered, recycled, repaired or remanufactured.¹³

Another approach is to replace materials used for cushioning with new products that are recyclable, such as mycelium-based (a kind of fungus) packaging from specialist manufacturers like Grown. This uses natural alternatives to fossil-fuel based plastics.¹⁴

The Body Shop is one of a growing number of consumer brands that have made the commitment to use only plant-based or recycled plastic packaging. In 2019, they introduced a recycling scheme which removed 21 tons of plastic from their packaging and adopted a 'return, recycle and repeat' scheme to encourage consumers to send back empty product containers for reuse.





Mycelium-based packaging

French brand Amen deliver candles in carbon-negative packaging made from mycelium and agricultural waste.



Algae-based packaging

Chile-based designer Margarita Talep has created a sustainable, biodegradable alternative to single-use packaging, using raw material extracted from algae, 2019

Enabling the circular economy

Modern logistics largely reproduces the ‘take-make-waste’ approach to production and consumption. However, the industry could play a key role in enabling the transition to a truly circular economy.

Many logistics service providers already practice reverse logistics in order to manage product returns, moving goods from customers back through the supply chain to the distributor, or even the manufacturer. It does not take a huge leap of imagination to see how reverse logistics could be used to support recycling, refurbishing or resale of goods.¹⁵

Some consumers now prefer to rent products, a model enabled through reverse logistics. Department store John Lewis recently began a scheme to provide a rental service for furniture. If the consumer wants to return the item, it will be collected and repaired at the end of each rental and sent to new customers.¹⁶

Other parts of consumer society have embraced the sharing economy, defined as a peer-to-peer (P2P) activity for acquiring, providing, or sharing access to goods and services. There has been an explosion of online platforms in this sector, such as OLIO (unwanted food), Turo (cars), and Mooch (items only needed for a short period of time, such as tools or camping equipment). There is also a plethora of platforms for buying, selling or donating products and items such as Facebook Marketplace, Freecycle and Freegle.

Consumer interest in home DIY, repair, reupholstery and upcycling (or downcycling) – together with movements such as ‘Right to Repair’ - may increase, helping to drive awareness of unsustainable product design and catalyse the transition to a more resource efficient, circular-minded future.



Right to Repair

Protesters gather outside of the Albert Borschette Conference Centre in Brussels, 2018

Accidents, noise and air pollution

The rise in home deliveries generates many urban transport challenges and can add to congestion. Congestion on roads leads to more accidents and injuries, and presents a hazard for pedestrians, cyclists and public transport users. HGVs are disproportionately involved in collisions where cyclists are either killed or seriously injured.¹⁷

All delivery vehicles also impact air quality and cause noise pollution, which can impact footfall, active transport choices and travel behaviours across our streets. The issue is not just carbon emissions but also pollution from brakes and tyres, and the waste resources hidden within supply chains. There is a need not only to move to low emission vehicles but substantially reduce the number of vehicles moving around and for supply chains to proactively reduce wastage and support a low carbon way of living

Most towns and cities have local restrictions designed to protect residents from noise during anti-social hours. In London, the London Lorry Control Scheme (LLCS) restricts the movement of the heaviest lorries to a reduced number of routes around central London at night and at weekends. Penalty Charge Notices (PCNs) are issued to operators and drivers if heavy vehicles are driven on routes other than those permitted.

The London Lorry Control Scheme (LLCS) restricts the movement of the heaviest lorries to a reduced number of routes around central London at night and at weekends.



A better future for urban logistics

How can we continue to experience the benefits and convenience of modern logistics while ensuring our cities remain liveable and simultaneously reduce emissions? In this chapter we look at different avenues for improving how the logistics industry works.



The last mile

The last mile (getting products from final distribution centres, logistic hubs or local producers to the consumer) is a particular focus area for innovation. Funding directed at last mile start-ups rose dramatically from US\$390 million in 2014 to US\$3.9 billion globally in 2018.¹⁸ And in a 2020 survey of over 200 logistics industry experts, 45% believe robots, or automated ground vehicles (AGVs), will be delivering parcels at scale within the next five years.¹⁹

Across the logistics industry, robots and autonomous vehicles have so far had the most impact within warehousing operations. For example, online food shop Ocado is developing self-driving vehicles, including a range of trucks and drones, for use in and around its customer fulfilment centres.

That said, experiments in last mile delivery are bearing fruit. In the United States, Amazon has used a robot to deliver small and medium sized packages in Washington state and Southern California. The town of Milton Keynes in the UK has been trialling a fleet of small robots which deliver food or groceries. And FedEx has launched a robotic delivery vehicle that allows retailers to accept orders from nearby customers and send them directly to the consignee's home.

Among the issues currently hindering further uptake of AGVs are battery life and social acceptance - suppliers and consumers alike will need to have confidence that AI will be able to transport goods safely and securely.

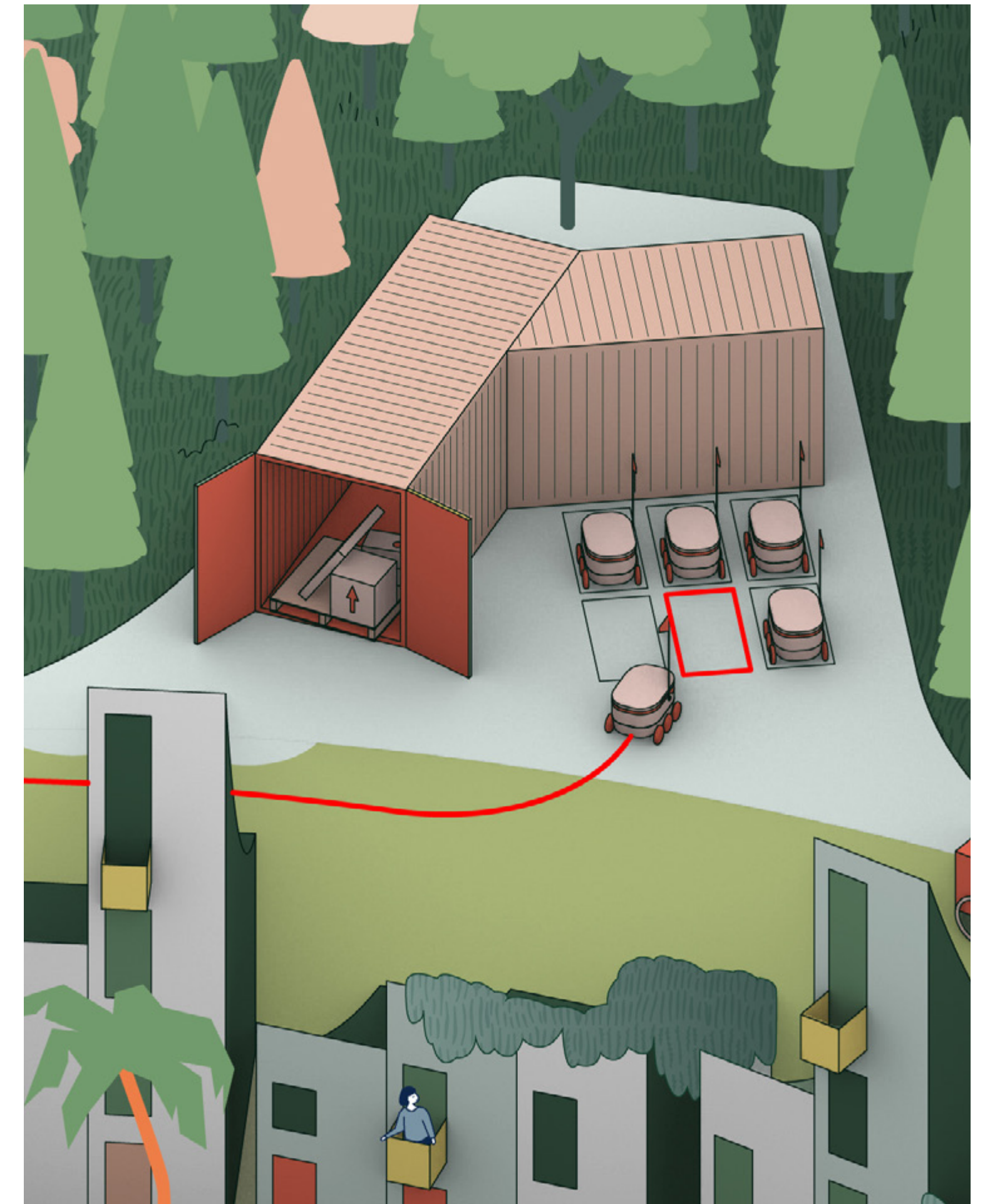
A shorter-term opportunity for last mile innovation has been enabled by advances in sensor technology. Sensors placed on the side of the street, particularly in critical areas like loading bays, can detect if delivery vehicles are parked or not.

They can then inform other delivery vehicles of available bays to prevent double parking and unnecessary circulation. If parked illegally, the same sensors can inform a designated authority for enforcement.

Not all solutions for an optimised last mile need to be especially high tech. In Hamburg, Germany, UPS has placed four containers at central locations for interim storage of packages. Last mile deliveries are then conducted on foot.²⁰

Similarly, a recent 'portering' trial, where a person meets a van at the roadside to collect a consignment of parcels for delivery, reduced the amount of time that vans parked at the kerbside by 50%. It also reduced the vehicle distance travelled per consignee by 30%.

Over time, semi-autonomous delivery vehicles could be used to follow parcel-delivery staff, enabling them to distribute more items and greater loads. And further ahead, autonomous delivery EVs may no longer need to be accompanied by human delivery staff at all – representing the next frontier in tech-enabled parcel delivery.



E-cargo bikes and freight pipelines

Unmanned Aerial Vehicles (UAVs) or drones have, for a number of years, been seen as the solution to logistics congestion. However, in 2019 less than a third of logistics firms predicted that drones would create a new mode of transport.²¹ Meanwhile, DHL and Amazon have both quietly reduced or wound down their drone operations (named Parcelcopter and Prime Air, respectively).^{22 23}

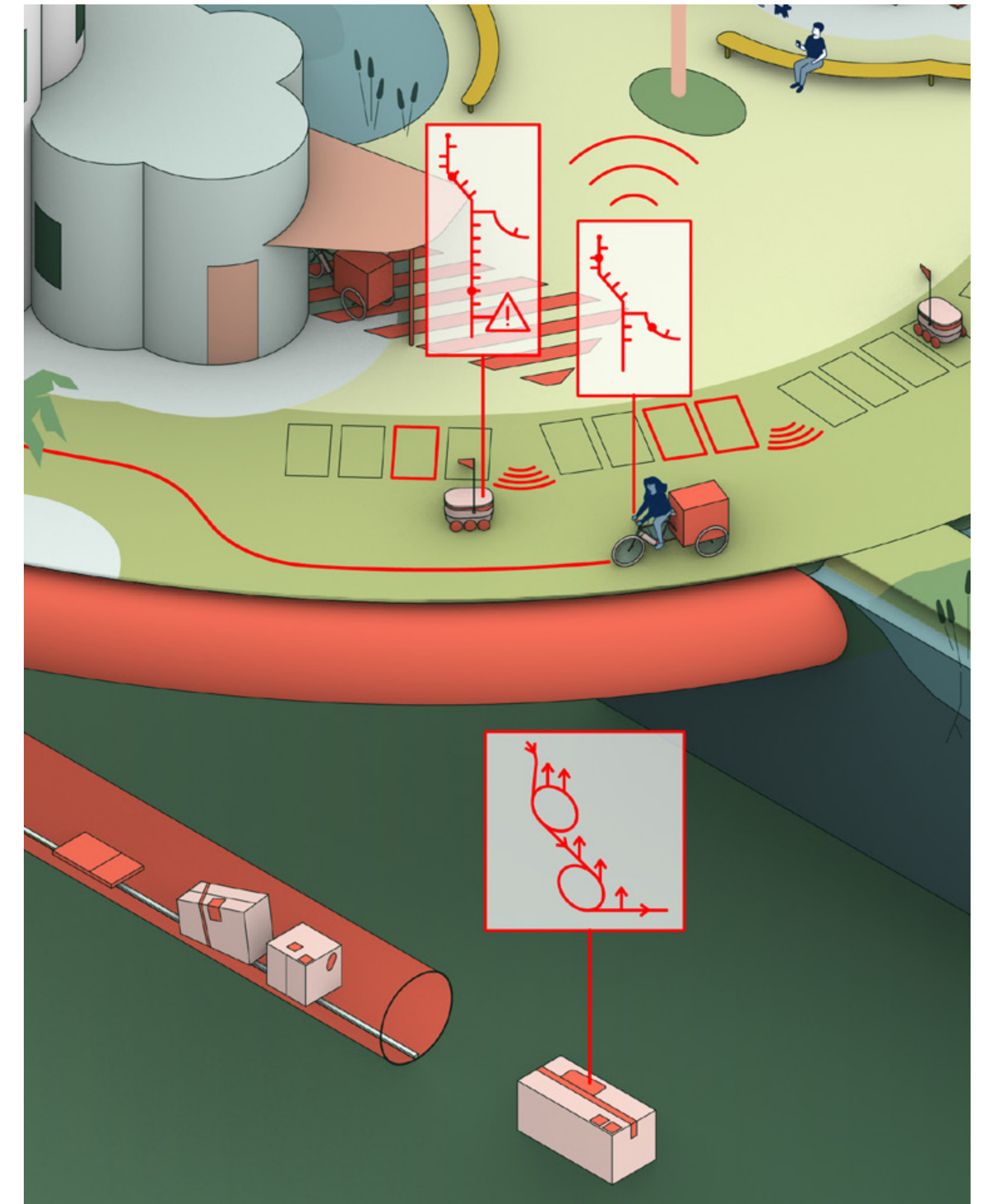
Although drones can fly over buildings in a straight line, they can only deliver a small payload on one round-trip. Whilst they may find their place in certain use cases, such as rural logistics, various drone pilot schemes have shown that they bring about new challenges relating to the regulation of air traffic, as well as noise pollution and social acceptability issues.

Sometimes innovative takes on existing solutions can be particularly effective. Cargo bikes, for example, have the advantage of being able to weave through gridlocked traffic or avoid it altogether by using dedicated cycle lanes. They can often be wheeled into drop-off destinations rather than having to park illegally - a problem endemic to van deliveries. According to research by the municipality of Amsterdam, the average loading and unloading time for delivery vans and lorries is 12 minutes – the same amount of freight can be unloaded from a cargo bike in as little as three.²⁴

The recent introduction of electrical assistance to traditional cargo bikes has significantly improved their ability to carry heavy loads over longer distances; most can carry payloads of up to 125kg. E-cargo bikes or tricycles are cleaner and quieter than motor vehicles and occupy a much smaller footprint than a van when loading and unloading at the kerbside. Some cargo bikes may be able to use more direct routes away from the roads too - for instance, crossing public parks.

In the UK, there has been a rapid uptake of e-bikes by last mile delivery workers, causing the electric bicycle market to grow considerably. Electrically-assisted cargo bikes have been the subject of trials in various cities in Europe. Replacing vehicles with bikes has a compelling and positive impact on congestion, air quality and noise pollution.

Finally, a completely different direction for the last-mile may be to go underground. UK start-up Magway wants to build and operate a network of underground tunnels for the delivery of goods. These could run along transport corridors or under cities, with entry and exit points referred to as terminals. These tunnels, less than one metre wide, would facilitate the movement of zero-emission pods carrying parcels and groceries along a track powered by a magnetic motor. Entry terminals could be located next to a consolidation centre, while exit terminals would be situated at a secondary consolidation hub.



New spaces and infrastructure

The development of urban infrastructure often happens at a much slower pace than supplier-led innovation or changing consumer behaviours. As a result, urban infrastructure can sometimes struggle to effectively handle new spatial demands.

To get around the lack of dedicated infrastructure, retailers and suppliers can offer a kerbside delivery or pickup services, whereby customers are given a time slot for goods delivered to a kerbside outside an agreed location. An initiative in New York City called the Neighbourhood Loading Zone program, provides kerb space for package deliveries from commercial vehicles (among other uses). This reduces double parking on narrow streets, helps keep bus and bike lanes clear of vehicles, reduces conflicts between cyclists and trucks and improves bus travel times.

Arup has designed a FlexKerb concept, which allows commercial delivery services to reserve kerb space for deliveries. Spaces can flex according to demand and time of day. For example, loading bays can be created during peak delivery times or revert to pedestrianised spaces during lunch hours.²⁵

Adaptive reuse and repurposing of spaces and infrastructure could create value for local areas, businesses and communities. There are many examples of repurposing inner-city sites to create common user consolidation centres, and micro-consolidation on local streets. Increasingly, proprietary lockers are appearing in retail stores, workplaces and other locations.

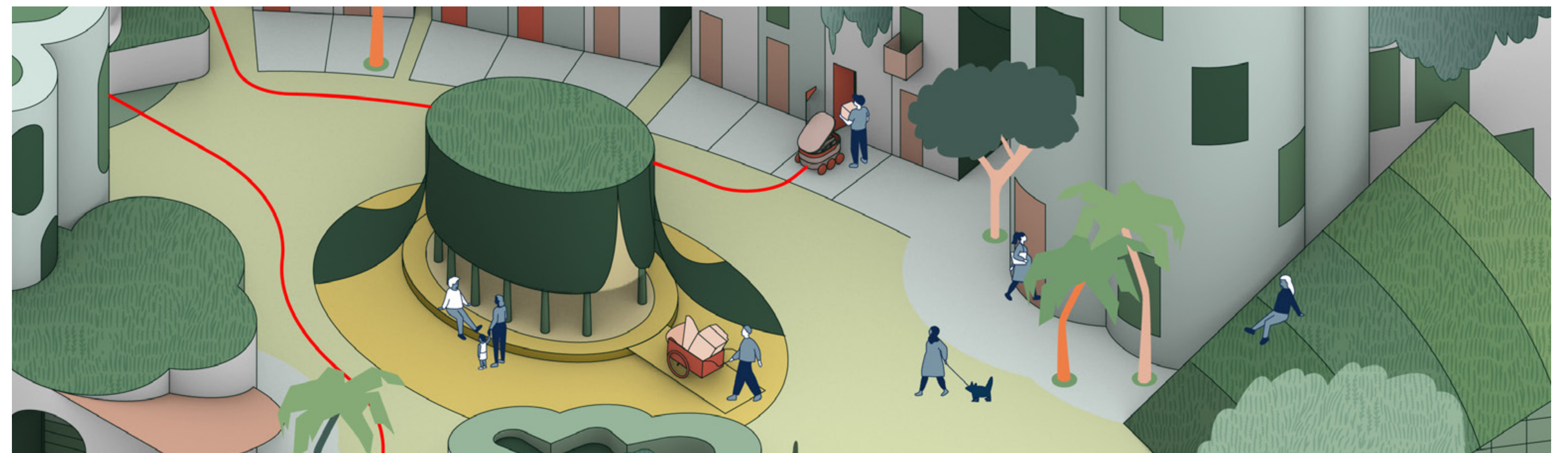
The latest innovation in infrastructure is the introduction of 'dark kitchens' and 'dark stores.' Dark stores are traditional retail spaces that have been converted to local fulfilment centres for fast and reliable localised delivery, not directly accessible to the public.

Investment demand for real estate suitable for dark stores in London is already soaring. The Arch Company, which owns many of London's railway arches as well as light industrial units, has reported a six-fold increase in offers and lease agreements compared to the 12 months before the pandemic, with last-mile grocery companies including Getir, Quick Commerce and Farmdrop.²⁶ Dark store start-ups also have significantly smaller operating costs than high-street supermarkets and grocery stores as they require fewer people to run and can make more efficient use of space. However the increased, individualised deliveries have an impact on the street.

The logistics strategy devised by an authority or developer could have a significant impact on the design of a masterplan. Therefore, it is important to consider the options available to deliver on or off-street servicing, or consolidation of deliveries and collection.

The benefits potentially derived from the various options need to be balanced with the capital costs of providing additional infrastructures, such as consolidation centres or podium structures, or ongoing operational costs through the need to actively manage deliveries, collections and waste. Decisions regarding the logistics strategy could create constraints that impact people's experience and quality of life in a town or masterplan and therefore may influence how attractive it is to new residents. Any masterplan logistics strategy should build on the following primary drivers:

- To positively respond to climate change
- To materially reduce traffic flow enabling quality of space /placemaking
- To enhance user experience and quality of life



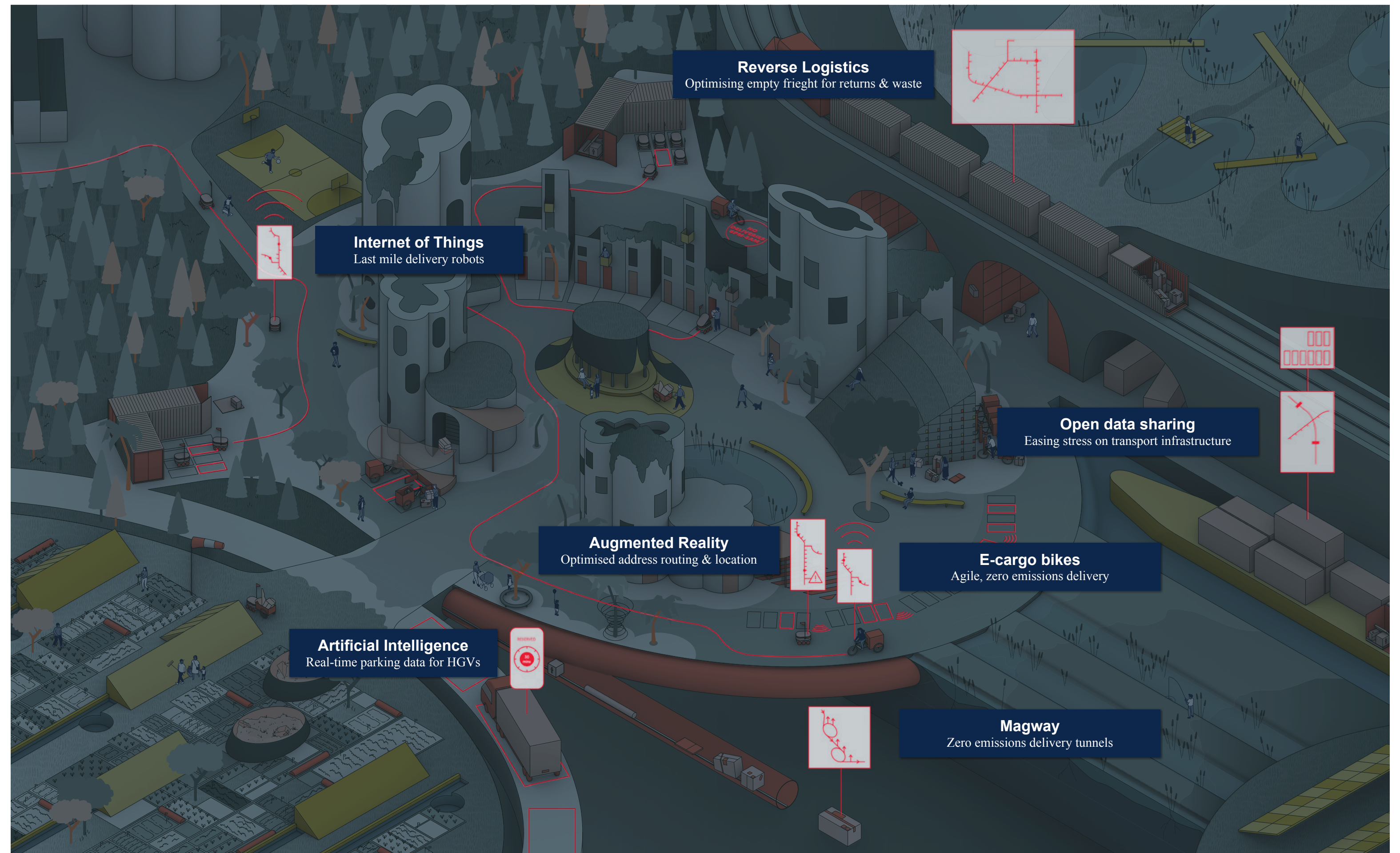
Data-driven insight

Data-driven insight will help all stakeholders to develop a more integrated and sustainable strategy for urban logistics. By making more efficient choices informed by real-time data, we can do more with fewer resources.

However, a recent consultation on urban freight transport identified that data on urban logistics is not available in most European cities.²⁷ Sharing data between private logistics providers and local authorities would help city authorities to understand the scale and nature of the problem and create appropriate plans and solutions in response.

The UK's Department for Transport has been emphasising the importance of open data to drive innovation. Companies such as Citymapper, Uber and Google have been able to use sophisticated methods, including Artificial Intelligence (AI), to model demand with the potential to ease the stress on transport infrastructure. However, these commercial entities will not release and share this data in an open way unless there is a commercial or regulatory requirement to do so.

New technologies and the Internet of Things (IoT) have allowed the physical city and its infrastructure to start to communicate with itself and with its users, aided by smart sensors and cloud computing. This will help unlock the opportunity for our choices to be smarter as we move people and goods around the city. For example, Augmented Reality (AR), already used increasingly in warehousing operations, could be introduced into last mile delivery to feed live information relating to traffic and optimised routing to drivers or cargo bike operators. It could import data from a service like Google Street View to help the handler locate an address via a pair of glasses or on a windshield, for instance.



Decarbonising our roads

There is increasing pressure to decarbonise the logistics sector. Whilst only about 6% of total UK freight kilometres travelled were in urban areas in 2016, it is in urban areas where carbon emissions are the highest per tonne moved.²⁸

Government and industry will need to work together to expand infrastructure such as EV charge points, priority lanes and loading bays. Entire fleets will need to switch to low emission vehicles over time, with the prevailing technology currently expected to be electric vehicles. Battery technology will need to improve to increase vehicle range and efficiency to achieve complete adoption, but the auto industry is making progress in this regard, with some electric cars now able to travel over 400 miles on a single charge.

But besides removing carbon from the logistics process, reducing demand and miles travelled in the first place will offer rapid and significant benefits in the short term. Dynamic routing offers a means of doing this by using real-time data and predictive algorithms to assess the best routes for freight vehicles to make deliveries. It is increasingly being used to improve delivery times and reduce congestion. The implementation of dynamic routing based on order volumes and delivery times can improve truck flow, reduce congestion, save time and reduce costs.

Artificial Intelligence can also help. Amazon uses AI systems to guarantee two-hour deliveries. They employ what they term ‘anticipatory shipping’ which predicts when, where and which items will be purchased by customers based on the history of buying habits in any given neighbourhood. When an Amazon customer orders a popular product, it will be dispatched from a local hub – increasing trip efficiencies and reducing overall vehicle distance travelled.

They also use AI to predict how many delivery drivers will be needed at a given time and to determine the number of shipments and the most efficient way to store packages in a vehicle.

AI can help reduce emissions in other ways. MIT conducted a study to determine the most efficient routes and fleet composition for last-mile delivery vehicles for a Mexican retailer, using machine learning and advanced geospatial analysis. Estimates suggest that (up to) 7.2% reduction in fuel consumption and CO2 emissions is possible.²⁹

The use of alternative or combined modes for moving freight around will also be required – utilising trains, rivers or canals for instance. Rail and water already carry 10% of freight trips in the UK. These modes of delivery are particularly important for heavy and containerised goods, with about 40% of construction materials being brought into London by rail.³⁰

Shifting more freight onto other, less carbon intensive modes will reduce congestion on roads, freeing up space on the network for other uses including active and public transport. It would also improve air quality and reduce noise pollution.

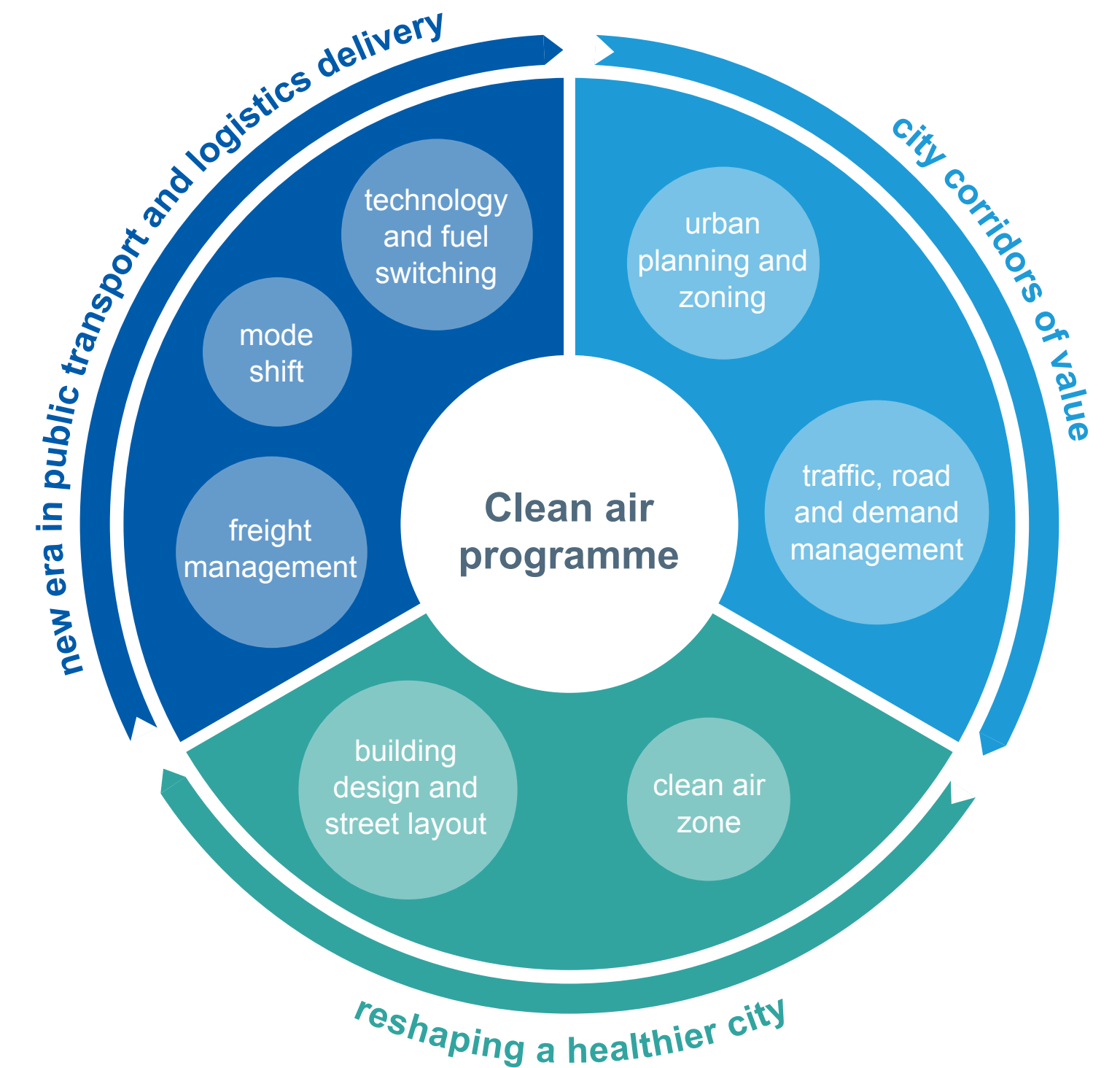


Fig. 3.
Clean Air Programme

Conclusion: go fast and innovate

The logistics sector plays a pivotal role in the modern urban economy. It employs tens of thousands of people and has introduced exciting innovations. It provides unprecedented convenience to consumers and it has helped many businesses and individuals get through the pandemic and lockdowns. But, as with many fast-changing industries, its growth has also had several unexpected and undesirable side effects, as this report has described. The onus is now on delivery companies, e-commerce businesses, the wider supply chain, government and local authorities to address these issues.

A successful and resilient future for logistics will be founded on governments, city councils and the transport industry working more closely together. Perhaps the greatest responsibility lies on the shoulders of logistics companies, who must demonstrate accountability for the social, economic and environmental impacts of their operations. By investing in technologies and techniques to reduce the impact they have on the urban sphere, logistics businesses can be a force for good. The industry must remain transparent in its decision making, and build in resilience across supply chains to better manage uncertainty and withstand systemic shocks.

Government and urban planners will also play a vital role here, by setting clearer expectations of what the industry must do with regards to climate action, net zero and sustainability. Cities must define what standards they expect of logistics firms, be that around the use of recyclable packaging, electric vehicles or minimum loads in vans. Government can also incentivise certain types of behaviour – such as offering special rates to firms that use ‘green’ delivery methods. Without clear rules, the industry cannot plan effectively. Designers must consider the access requirements and infrastructure needs for integrated logistics in our neighbourhoods, new and old.

Aside from policy interventions, masterplans and regeneration strategies should embrace change and adapt to new ways of working. The desire to use new technology or consolidate everything needs to be balanced with the costs, in the context of construction, carbon and operational impacts that affect climate change, decarbonisation and affordability. We should remember that the humble street has served us well for many centuries and will do so for many more. It is resilient and agile, serving different users and uses across the day and night. Innovation and automation must be encouraged whilst retaining great placemaking and connectivity.

The prize for innovation and investment in urban logistics is huge. By following best practice, logistics firms can continue to tap into a rapidly growing market while also ensuring that the industry becomes more sustainable, socially accepted and able to support vibrant cities and communities for all.



Contacts



Darren Briggs

Director of Logistics Consultancy

e: darren.briggs@arup.com

6th Floor, 3 Piccadilly Place, Manchester M1 3BN

arup.com



Marcus Morrell

Foresight Lead, UKIMEA Region

e: marcus.morrell@arup.com

8 Fitzroy St, London W1T 4BQ

arup.com

Bibliography

- 1 Statista. Last mile logistics worldwide. (2020). <https://www.statista.com/topics/4383/last-mile-delivery/#dossierKeyfigures>
- 2 World Economic Forum. The Future of the Last-Mile Ecosystem. (2020). https://www3.weforum.org/docs/WEF_Future_of_the_last_mile_ecosystem.pdf
- 3 National Infrastructure Commission. (2018). Future of Freight – Interim Report. <https://nic.org.uk/app/uploads/Future-of-Freight-Interim-Report-2.pdf>
- 4 Department for Transport (2019). Transport Statistics - Great Britain 2019. Pg. 19. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/870647/tsgb-2019.pdf
- 5 <https://www.paragonrouting.com/en-gb/blog/post/empty-running-rise/#paragon-uk-RoadTrafficEstimates>
- 6 Empty running on the rise - Paragon Routing. Paragon Routing. (2021). Retrieved 20 August 2021, from <https://www.paragonrouting.com/en-gb/blog/post/empty-running-rise/>
- 7 What makes a Sustainability Leader? Case study: JD Wetherspoon & DHL. edie.net. (2021). Retrieved 20 August 2021, from <https://www.edie.net/library/What-makes-a-Sustainability-Leader--Case-study--Wetherspoons-and-DHL/6625>
- 8 McKinsey. The future of parcel delivery: Drones and disruption. McKinsey & Company. [Online] 10 12 2019 <https://www.mckinsey.com/featured-insights/the-next-normal/parcel-delivery?cid=other-eml-nxn-mip-mck&hlkid=16cdee346fb94923aaa6aedb413ef77d&hctky=11427579&hdpid=1b7a1675-65d9-476d-8095-3a21801dacd6>
- 9 2020 Retail Trends. Modern Retail. (2020). Retrieved 23 November 2021, from <https://modernretail.co.uk/2020-retail-trends-uk/>
- 10 Statista. (2021). Last mile logistics worldwide
- 11 MIT Sustainable Logistics Initiative. (2021). Retrieved 20 August 2021, from <https://sustainablelogistics.mit.edu/green-button-project-consumer-preference-for-green-last-mile-home-delivery/>
- 12 <https://ourworldindata.org/carbon-price>
- 13 Biffa Sustainability Report 2021. Biffa. (2021). Retrieved 23 November 2021, from <https://www.biffa.co.uk/-/media/files/sustainability/sustainability-report-fy21/biffa-sustainability-report-fy21-full-version-final-210621.ashx>
- 14 <https://www.grown.bio/mycelium-packaging/>
- 15 A Guide to Reverse Logistics. Oracle NetSuite. (2021). Retrieved 20 August 2021, from <https://www.netsuite.com/portal/resource/articles/inventory-management/reverse-logistics.shtml>
- 16 Never knowingly under-leased - John Lewis moves to rent out its furniture. the Guardian. (2021). Retrieved 20 August 2021, from <https://www.theguardian.com/business/2020/aug/15/never-knowingly-under-leased-john-lewis-moves-to-rent-out-its-furniture>
- 17 Transport for London. (2018). Improving Cyclist Safety in London.
- 18 Statista. (2021). Last mile logistics worldwide.
- 19 Last Mile 2020: Before and after COVID-19 (2020) Last Mile experts
- 20 Urban Transport Group. (2021). White Van Cities: Questions, Challenges and Options on the Growth of Urban Van Traffic.
- 21 Arup. (2019). Future of Grocery Supply Chain Resilience.
- 22 Singh, I. (2021). Amazon drone delivery program 'never going to get off the ground,' UK report reveals. DroneDJ. Retrieved 20 August 2021, from <https://dronedj.com/2021/08/03/amazon-uk-drone-delivery-program-fail/>
- 23 Singh, I. (2021). After Amazon's UK cutbacks, DHL abandons Parcelcopter delivery drone project. DroneDJ. Retrieved 20 August 2021, from <https://dronedj.com/2021/08/09/dhl-abandons-drone-delivery-plans/>
- 24 Reid, C. (2021). Cargobikes Not Drones Are The Future For Urban Deliveries. Forbes. Retrieved 20 August 2021, from <https://www.forbes.com/sites/carltonreid/2018/10/15/cargobikes-not-drones-are-the-future-for-urban-deliveries/?sh=7f54ba9e790f>
- 25 https://www.arup.com/-/media/arup/files/publications/f/flexkerbs_roads-for-the-future_arup.pdf
- 26 Super speedy grocery delivery start-up Dija launches in London. Sifted. (2021). Retrieved 26 August 2021, from <https://sifted.eu/articles/dija-launch-london/>
- 27 EU Consultation workshop on urban freight, transport and logistics 21 June 2021 https://ec.europa.eu/transport/sites/default/files/20210621_umi_urban_logistics_workshop_summary_final.pdf
- 28 National Infrastructure Commission. (2019). Better Delivery: The Challenge For Freight.
- 29 Barkah, A., & Robert, P. (2021). Route Clustering in Transportation with Geospatial Analysis and Machine Learning to Reduce CO2 Emissions.
- 30 <https://www.london.gov.uk/sites/default/files/mayors-transport-strategy-2018.pdf>

