

PARCELS AS PASSENGERS



An exploration of the rail network's role in the sustainable delivery of parcels

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INNOVATION
GROUP

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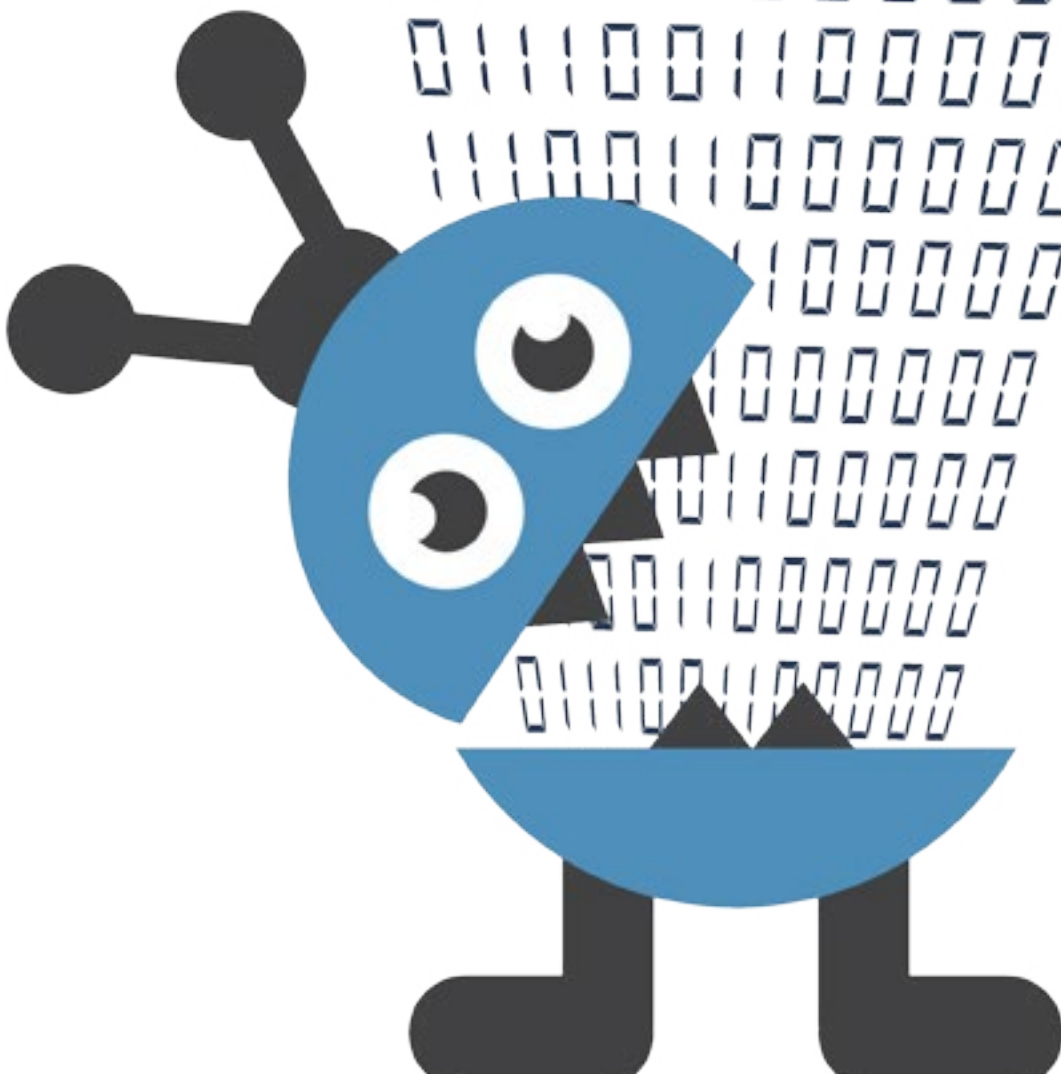
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THE RAIL INNOVATION GROUP



The Rail Innovation Group is an independent community established to help build the tech ecosystem in rail. The group's overarching aims are to facilitate cross industry conversation and collaboration and support start-up companies to supply into rail.

Our mission is to support positive change in the rail industry, whether that's by encouraging diversity and culture change, promoting innovation, building digital supply chains or developing a data-driven, consumer-focused approach. You can find out more about what we do here.

We are pleased to have gained insight from existing suppliers, already moving packages on passenger trains, which has enabled us to release this paper. Our hope is that this paper will stimulate a conversation within the rail sector and the logistics industry.

Our paper highlights how this is already happening—and our hope is that this paper will stimulate further collaboration between the rail and the logistics industry and accelerate the expansion of this model.

As the UK recovers from the mobility and economic impact of the Covid-19 pandemic, we want to support the government's ambition to build back better. What better way than to utilise one of our most valuable national assets, our comprehensive railway network, as the backbone for an integrated, green and efficient distribution system. Our focus is to move small goods around Britain but the potential exists in all places with expansive rail networks.

In the modern European context, putting packages onto a train might not sound very innovative to some readers who might even recall British Rail's Red Star parcel service. It's true that railways have been moving goods since the very start; however, somewhere along the way, and we're sure for the best of reasons, it was decided to specialise—there would be freight trains, and there would be passenger trains. So that's where we are...

Through this research—we've found examples where mixed services have continued to take advantage of the speed or geographic benefits of the 'passenger' rail network. Whilst we don't have passenger areas on freight trains, we have noted many examples where goods have been carried on passenger trains. Whether it's fresh fish, or biomedical samples, passengers have been unknowingly sharing their services across the network. When you think about it, this shouldn't come as a surprise to anyone who's sat on an aeroplane watched the cargo being loaded underneath.

We commenced this study to consider whether, during a time of suppressed demand and significantly increased financial support through the Covid-19 period, there might be more efficient operational concepts to help rail meet the needs of the real-world economy as a relatively clean mode of transport, with both parkway and city centre nodes. In addition, the expected permanent reduction in the five-day commuting pattern, may have a lasting effect of relieving the capacity challenges seen in the last decades.

Equally, Covid-19 period has increased the number of small packages being delivered to homes and businesses across the country. This need being met in the most part by a fleet of light goods vehicles that has increased traffic in conflict with government policies to reduce road transport. We wanted to explore if rail could play a bigger role in deliveries and help reduce these motor vehicles on the road. Our study has looked at how goods can get to the rail hub, and how they can get from their destination station to delivery without being loaded onto a van. We have been keen to exploit the existing growth of e-cargo bikes into our rail logistics proposal.

The 'innovation' in this concept takes three parts:

1. To consider and meet the physical space requirements for carrying packages on trains.
2. To build in the inventory of passenger rail services, capable of taking goods, into digital logistics, booking and tracking systems.
3. To integrate longer-haul rail carriage with active travel modes for the onward distribution and delivery.

On to the experts...

Parcels as Passengers—back to the future on the railways

The Chartered Institute of Logistics and Transport

The Chartered Institute of Logistics and Transport has recently published its policy recommendations to government on the future of transport on the 'Routes to net Zero'. Among the 21 specific recommendations in a highly detailed paper were five proposals that knit together to create a new vision for logistics:

- #7 E-bikes should be supported but e-scooters should not be permitted on footways
- #9 All home deliveries should be undertaken by electric vehicles by 2030
- #11 ...a rolling programme of rail electrification should be implemented...
- #14 Local authorities must prepare Active Travel Plans that take account of the needs for servicing delivery, emergency access and disabled people by 2025

- #17 Governments should support modal shift to rail freight with targeted interventions.

The implications of this (slightly dry) policy wording are nothing short of seismic for national logistics operations and our city centres. The evidence and precedents for the proposals are unassailable. The sale of diesel and petrol vans has already been banned for 2030—so the proposal #9 simply brings forward the time at which parcel operators need to start replacing their fleets with electric to 2026 to fit with the heavy duty lifecycles of these vehicles and allow time for re-purposing the existing parc. Part of that replacement process will allow the rapid adoption of the e-cargo Bikes; #7. The fact is that electric cargo bikes are virtually zero emissions in terms of both carbon and particulates: less than 0.5% of a carbon powered van and less than 1% of the equivalent electric vehicle, to deliver same payload in same time frame.

Rail, both passenger and freight, is already the most carbon efficient as a high proportion of the rail network is already electric and the UK has among Europe's greenest power supply. Filling the electrification gaps (#11) in the network and transferring freight power from diesel to electric is a very much cheaper option than electrifying the motorways for bulk freight movements. This modal shift will not only help to decarbonise faster but will also relieve congestion. The case for modal shift (#17) is difficult to counter—it will be cleaner and faster to achieve.

Local authorities already have the responsibility to improve their air quality; recent Supreme Court judgements have found our national government delinquent in its planning to make improvements and they have smartly passed the baton to local authorities on the basis that the 'solutions' need to be local. (#14).

The effects of the pandemic on logistics demand and the streetscapes in our cities are unprecedented. With the closure of retail outlets and a nervous population the growth in home delivery has been remarkable with retailers recording like-for-like increases of more than 50% and in some cases 100%. At the same time local authorities have been empowered to increase capacity for walking and cycling, expanding the size of lanes and blocking routes in suburban streets. This is inevitably creating difficulties for delivery and servicing activities by vans and smaller HGVs, with associated productivity loss; it is hardly surprising that the moves have triggered vociferous lobbying.

Delivery and servicing plans for boroughs, districts and localities will be part of future local authority planning but has yet to be based on any validated exemplars. Research at Aston University and by members of the CILT policy groups has shown conclusively that the published databases on commercial traffic generation are inaccurate and irrelevant to the new environment. These plans, as they form, will engage a suite of well known solutions in a mix that is appropriate for the commercial traffic generation of each locality. That suite will include regulation of access and parking, edge of conurbation consolidation, urban hubs, micro-hubs, and cargo bikes; none of these measures is a silver bullet, all will be needed.

And into that mix comes the opportunity to use rail both as primary distribution and as urban hubs. Those of us who remember the Red Star parcel service with affection—see this as a 'back to the future' measure. That was a small volume, premium same day service in the face of most parcel operations then being 2 or three days. Now a timed next day service is the industry standard with real prices falling by as much as 75% on pre-pandemic volumes of 3 billion units per year.

This huge industry faces the challenge of decarbonisation and increased regulation at the same time as consumers want same day—on demand delivery. The vision of using rail as the primary movement and railway stations as hubs or micro-hubs supported by cargo bikes is an exciting one and made all the more attractive by the likely long-term reduction in rail passenger travel as the nation recovers from the pandemic and adjusts working and commuting practices. Passenger carriages can be reconfigured to hold roll cages and be an integral part of trains that also carry passengers.

While stations will struggle to accommodate a good number of vans, the access for cargobikes will be much easier. The transition to a low carbon—city friendly future can be both assisted and accelerated by this vision. For customers, the the same day service they seem to crave can be made available.



On the face of it, there is nothing not to like! So where will the barriers be? In a nutshell the answer is economics and self-interests. Even at volume, parcels as passengers is not likely to yield the same earning capacity as ticketed people and will involve re-organisation of carriages, platforms and schedules. But my knowledgeable friends in this sector say that has all been done before and can be made to happen if the will is there.

The alternative of the established parcel networks is well established and heavily invested; but it is not paying its full carbon cost. Any transition to parcels as passengers will not be mainstream till the societal costs are fully re-balanced to reflect the carbon and the infrastructure of the options. That process is not an easy one as the heritage of rail freight grants and track access fees might attest; self-interest and politics can easily get in the way of objective evidence. Given the difficulty of getting environmental costs agreed that truly reflect (inter alia) the health risks of poor air quality and the opportunity costs of climate change, there is a case for bold actions by government and Local Authorities. Some LAs are taking action individually but without a national framework; that framework is needed to ensure consistency. And while this is an urban priority, parcels as passengers is applicable to rural services, providing the opportunity to replace extended stem mileages in vans with local cargo-bikes and smaller vans.

So while the vision is clear and highly attractive there is much work to do in the corridors of power to put in place the conditions that allow it to happen. As with so many developments, the momentum will build to the point where this innovation will be commonplace and self-evident. As the reader can see, I have an interest in this success but nonetheless I hope you find my assessment objective.

Alan Braithwaite

Chairman of the CILT Freight and Logistics Policy Group and a non-executive Director of e-cargobikes.com Ltd.

Using our national asset to the best effect shouldn't be a hard sell

Intercity Railfreight Ltd

Intercity Railfreight is a logistics business that specialises in the use of rail transport as a means of delivering fast, cost effective and sustainable supply chains. In 2011 Intercity Railfreight pioneered the re-introduction of freight carried on passenger trains, on the basis that this is a model that addresses the growing concerns around road congestion, pollution and climate change whilst giving customers an extremely fast, flexible, secure, reliable and cost-effective service. Rail is a highly disciplined industry, and its framework encourages the business to focus very closely on the key components of good logistics:

- high levels of competency among those operating the system;
- careful planning and preparation;
- absolute attention to detail;
- thorough and well tested contingency plans;
- ensuring high standards of timekeeping and reliability; and
- timely and accurate communications.



The company has proved a model that were capacity to be made available with no changes to rolling stock or timetables can provide a sound revenue stream for the industry. ICRF can identify off-peak services on key routes that are lightly loaded with passengers: one carriage can be locked out and used to carry freight with the remaining passenger capacity allocated via pre-booking—and as such can demonstrate how freight moved via trains and railway stations can be easily synchronised with low/zero emission transport for that important first and last mile, underpinning a range of initiatives and policies designed to make our towns and cities less congested, cleaner and healthier. ICRF has demonstrated how first and last mile support can be dynamically and accurately integrated such that cargo bikes and electric vehicles can be optimised to cut journeys, courier time and costs.

What are your current markets?

For over 7 years we have been handling and transporting successfully time-sensitive ambient and temperature-controlled healthcare consignments. to deliver the critical components of speed, sustainability, consignment management and tracking and temperature control. We can offer chilled and frozen capability and a range of location/temperature tracking options, as well as access to a range of highly specialist online systems enabling to-the-second supply chain management and integration of essential supply chain components and communication.

In August last year we announced a major expansion of our same—day 125mph delivery network. ICRF now has access to over 100 × 125mph daily rail services across the East Midlands, Great Western and CrossCountry franchise networks, so there is the potential to move parcels via fast and frequent services

between city centres, across an area from Aberdeen to London and Penzance—covering a number of traditionally difficult parts of the country for road-based couriers to reach.

InterCity's door-to-door service connects local couriers using electric vehicles and cargo bikes with a fleet of electric and diesel-electric high-speed trains—with some routes now offering a 100% electric supply chain. Shipments are tracked in real time from a central control tower with access to a suite of rail industry data feeds. The rail services average 70mph between city centres, with over 97% arriving within 15 minutes of schedule.

What have you done to communicate this model and prove its scalability?

In 2016 the DfT sponsored a report to look at the substantial value to the industry of carrying freight on passenger trains. The Arup study was extremely thorough and made a number of recommendations including that the commercial opportunity be publicised and private sector involvement to take forward this opportunity to carry goods by passenger trains be encouraged by the Department for Transport.

We have also engaged with special advisers to both health and transport ministers and met with three Rail Ministers. The Department for Transport produced a video about our services and we have won several awards: one for innovation in the rail industry and one for innovation in the medical industry.

What are the biggest challenges to making this model palatable?

The Department for Transport has been supportive in principle to date, but this was before Covid hit, and passenger revenues have since been significantly reduced. ICRF is an SME and I do wonder if we had been, say, DHL approaching government and other stakeholders then ministers might be more willing to listen and help make the necessary changes. As things are, despite train operators being mandated to

explore any conceivable means of revenue generation, and us having traffic ready to go, we still can't secure the capacity we need on routes that could be very lucrative.

We have been engaged with Network Rail at various levels for many years, helping to steer thinking on a diverse range of strategic topics from trainload express freight to e-commerce initiatives at stations and on trains.

However, the empty commuter trains around our big cities coupled with the dramatic losses in business activity have meant a huge dent in industry's profits and potentially turned upside down the notion of leisure—or 'optional'—travel as an 'off peak' phenomenon that exploits the capacity offered outside of the commuting and business sectors. In this new context, I am hopeful that the Department will be willing to push TOCs to consider putting some freight on trains, as there is a strong imperative to show new potential revenue streams. And on this—there has been some good progress of late with a growing list of Train Operator's engaging with us.

What we need is strong leadership based on very clear vision. The emphasis really must be on how we make the very best possible use of a very costly asset to achieve the key objectives for the UK: carbon reduction, "build back better" and "levelling up". Government must recognise that the railway is a national asset that can not only support the UK's economic recovery, but also its aim to achieve net zero carbon emissions as part of the plan to decarbonise the transport system.

Jeff Screeton
Managing Director
Intercity Railfreight Ltd.

SOAP DAZE



London's challenges to making urban logistics sustainable

Centre for London

Why we need to change our approach to delivering London

What connects your plumber, some frozen peas, the contents of your kitchen bin and a surgeon's scalpel? Sounds like the set up for a sophisticated prank. Perhaps. More prosaically though, they all represent different aspects of a highly interwoven web of things (spare parts, food, waste, devices and much else) that need to move around our city. Without these things, and so too the mechanics of how they get moved around, the city, any city, ceases to function. Plainly put, the efficient delivery of goods and services are fundamental to London's ability to function. Though these myriad activities keep London running, they also pose significant challenges. They contribute to congestion, put pressure on the environment and worsen London's air quality. The Covid-19 pandemic has exacerbated these issues, accelerating the need for a decarbonised and more efficient freight and logistics operations.

There are a number of challenges that need to be tackled.

Freight traffic on roads is at record levels

90 per cent of all goods handled in London are transported by road, contributing significantly to urban congestion. In the last three decades, kilometres travelled by freight and servicing vehicles in London have increased and they now make up around one-fifth of the capital's traffic. This growth is largely due to the substantial increase in light good vehicles kilometres, which grew by 54 per cent between 1993 and 2019. Freight traffic is expected to increase, with Transport for London predicting an increase by almost 50 percent by 2041 without further interventions. Continued growth looks certain for three reasons.

1. A surge in deliveries

Data from the Office of National Statistics (ONS) shows that between 2019 and 2020, internet sales increased by 12 per cent. As online sales increase so too do expectations for faster, more frequent and precisely timed deliveries, with operators eager to fulfil this demand at a low or even zero cost.

2. Diminishing industrial land

Increasing land prices are pushing industrial and freight activities out of the city. As a result, goods vehicles are driving more miles to the deliver the same goods and services. This is a particular problem given London's size: operators looking for affordable spaces have to leapfrog the city's suburbs and its Greenbelt, settling far away from their customers.

3. A growing city

Although Covid and Brexit look to have dampened London appeal, London's population could easily keep growing and might reach almost eleven million by 2041, increasing the demand for housing, goods and services. The pandemic will probably slow the city's growth rate, but the recently published London Plan for example estimates a need for 66,000 additional homes each year.

Freight journeys come with a high carbon cost

Road transport makes up one fifth of all of London's carbon emissions, and shows no sign of reducing despite the net-zero rhetoric. And almost a quarter of carbon emissions from transport are from goods vehicles, despite freight only making up 17 per cent of total vehicle miles in London. Decarbonising the capital's road freight is crucial to achieving our overall net-zero goal, the target date for which is 2030 according to the current Mayor, Sadiq Khan. Plans to make this happen are, as yet, not clear.

Freight transport also makes a disproportionate contribution to air pollution

London regularly breaches legal limits of air pollutants, with two million people living in areas that exceed established thresholds. Freight vehicles travel through neighbourhoods where people live, work and go to school, and make a disproportionate contribution to air pollution.

Data from the London Atmospheric Emissions Inventory shows that a third of nitrogen oxide (NOX) emissions from road transport comes from freight vehicles, which also produce a quarter of the particulate matter (PM2.5) emitted by all vehicles. In 2016, the amount of NOX emitted by freight vehicles (7,170 tonnes) in London, was close to the total amount released by cars (8,133 tonnes), despite petrol and diesel cars completing almost five times more vehicle miles than goods and services vehicles in that same year.

Pollutants such as NOX are incredibly dangerous and cause serious health problems such as inflamed lungs, stunted childhood growth and the increased risk of respiratory diseases. These health issues can have fatal outcomes, with 9,400 premature deaths in London attributed to poor air quality.

Road dangers and noise

Freight vehicles, particularly heavy goods vehicles (HGVs), pose real dangers to pedestrians and other road users. According to the Metropolitan Police Service, between 2015 and 2017 there were 123 fatalities and 985 serious injuries involving goods vehicles on London's streets. Within that same period HGVs were involved in a quarter of pedestrian and nearly two thirds of cyclist fatalities, despite making up less than five per cent of total vehicle miles driven in London.

Goods vehicles moving through London's narrow streets and densely populated areas are often noisy and disruptive in other ways too, especially when loading and unloading. While retimed deliveries have been useful in reducing congestion, they often result in deliveries being made outside of peak hours, leading to disturbances at night for residents. New patterns of working as a result of the Covid-19 pandemic have led to more frequent deliveries at all times of the day, making noise a worsening issue.

Looking forwards

London is stepping up to these challenges, but more needs to be done and quickly. Policies and innovations within the freight and logistics sector are leading the way in decarbonising an industry in need of change. The Mayor's strategy includes ensuring that all new vans are zero emissions by 2030, extending the Ultra-Low Emissions Zone (ULEZ) from 2021, and identifying opportunities for moving more freight by rail and on the river.

Technology is changing fast too. Micro-consolidation hubs and micro mobility options such as e-cargo bikes could enable faster, cleaner, and more efficient last mile deliveries. There are also promising opportunities to coordinate deliveries across carriers, to make the most of van capacity, and to reserve kerb space for parcel drop offs so drivers do not have to circle for parking.

The key challenge is how to bring in these innovations soon enough—so the city can cope with the increase in demand for deliveries, while reducing the pressures they create. Centre for London's freight and deliveries project, will be exploring these questions to help create a smarter, fairer and more sustainable freight and logistics ecosystems, one that manages far more efficiently with your waste, your Amazon shopping, and the critical tools that keep our city working.

Centre for London

The capital's dedicated think tank
<https://www.centreforlondon.org/>

BUSINESS STORE



Providing shared electric on street cars, bikes and delivery for cities across the South West

Co Delivery

This time last year we were locked down at home, awaiting the outcome of the Energy Saving Trust bid which would bring 13 new e-cargo bikes to Exeter. We at Co Delivery collaborated with Devon County Council and partners across Exeter to put the bid together.

We are a cycle logistics cooperative and had been running three years by this point. We'd stayed quite small, focusing on wholesale deliveries for local bakers to shops and restaurants, and business to business deliveries. We wanted to expand our fleet to give us more capacity to service parcel and residential deliveries. We also wanted to trial a range of different bikes. Exeter is a hilly city. Even on our shortest daily runs we can be up 20% gradients before our first delivery. We put significant pressure on our motors and our bikes take a beating. The e-cargo bike market is developing all the time and we wanted access to some of the newer models to see whether they would work for us. We also wanted to show that cargo bikes could be useful for more than

just deliveries. Our partners were drawn from across the city and came on board to trial use of cargo bikes for teams who would otherwise have used cars or vans.

- Devon County Council wanted to use cargo bikes for Parking Enforcement
- Exeter City Council brought in their Environmental Health team, who would be making visits to catering establishments
- Royal Devon and Exeter hospital were talking to some community nursing teams
- University of Exeter wanted to use cargo bikes for travel between its campuses in the city.

The final bid was for a broad selection of bikes:

- an EAV 2cubed quadricycle and two ICENI mark 2 trikes, to service the high volume deliveries—the workhorses;
- an Urban Arrow Cargo L and a bullitt—two long johns with reasonable capacity but good speed; and
- Eight Tern GSDs, for flexible-cargo capacity but maximum ease of use for teams that might be sharing bikes between multiple users more accustomed to riding a normal bike.

The bid was submitted in very different times, before the global pandemic had reached our shores. How do things look a year later? When we found out we'd been successful in May, we doubled down fast on procurement of the bikes. Brexit was looming, as was the deadline for funding draw down. We didn't want to be held up with supply chain problems. By November 2020 we had the full set, with 12 of them arriving before we'd quite worked out where to store them. But it was clear by then that the pandemic had changed work patterns in ways that would fundamentally alter the original plans. Workers at the RD&E were flat out and had been for some time. The original team were not an option anymore. At the Councils and University, working patterns meant that workers were no longer in the office so bikes housed there were unlikely to be used by workers who now worked remotely and made visits from home. Where the bikes are in regular use partners are very happy with them. "The bullitt is brilliant" reports the Environmental Health Manager at Exeter City Council. "It took me a while to get used to the automatic gearbox, but now I whizz round on it, just like a normal bike but faster". As working patterns under the new normal settle down we'll be working with partners to see where the bikes could work best.

This change in working patterns has also altered Co Delivery's work. Overnight our wholesale deliveries dropped away as shops and restaurants closed. As lockdowns and social distancing continued through the summer, retailers turned their attention to home deliveries. This wasn't something we or our business customers had been doing before lockdown, so it was a learning experience for all of us, and we're still figuring a few things out. For us, our previously limited capacity had meant home deliveries were a particular challenge for us. We'd found it hard to break into parcel companies, and working just with local companies it was hard to get sufficient volume of deliveries to make it worth our while. With everyone at home, we had to adapt quickly and we now offer home deliveries of baked goods, locally produced fruit, veg and store cupboard groceries a few days each week, as well as providing a daily wholesale service to the shops that remain open, and a next day home delivery service for independent shops in the city.

We've learnt a lot about our different cycles and their relative strengths and weaknesses. Some cycles have better torque than others and so can better handle the hillier routes, while others have better battery life and so can manage longer routes without needing to swap batteries. We're improving our relationships with cycle manufacturers, eager to make sure their cycles perform well outside of the flatter, high density cycle logistics strongholds and so broaden their market potential. We're developing our systems for communicating with riders, scheduling tasks, and maintenance. We are ever in search of the perfect stackable crate. We crave better drop density to improve margins, but consolidation of deliveries brings its own challenges for picking and packing. We teeter on the precipice of rail freight, raring to go, just waiting for the nod.

Have we seen that customers are willing to pay a premium for zero emissions delivery? In general, not yet. For groceries, while a platform like Good Food Exeter offers sustainably minded customers the ability to buy direct from a range of local producers, it doesn't yet have the range and convenience of a supermarket shop. While customers might be prepared to pay £4–5 for a full weekly shop, they may not be prepared to pay that for multiple lots of delivery from different local producers. Local food production margins are already tight, and local producers aren't able to subsidise deliveries where large retailers might be willing to.

We are still yet to break into last mile parcel delivery. Parcel deliveries are estimated to have increased significantly during 2020—for Hermes for example they doubled on the previous year during locked down months and averaged a 66% increase on the previous year overall. The level of parcels they handled were what they had previously predicted for 2025, according to their CEO. As lockdowns ease, growth is likely to slow again but the convenience of shopping without leaving the house, coupled with a lasting change to more home working, is expected to continue the annual increases in online shopping witnessed before the pandemic.

This isn't a good thing for the planet. The last mile of parcel delivery is estimated to cost up to 80% of the total cost of a delivery, as parcels leave the bulk freight conveyor belt to chug through the residential streets and lanes of the last mile in largely diesel-powered vans. It's also the bit of the delivery that customers experience. Parcel companies compete for retailer contracts on the strength of their last mile performance, their ability to meet end customer desires for time or place or flexibility of delivery, and they invest heavily in technology to support this. Some work with subcontractors but with a high degree of control over systems for proof of delivery, leaving little room for consolidation between carriers to improve efficiency. End customers get no choice in which carrier is chosen by their retailer. Customers don't have an option to say "please collaborate with other parcel carriers so I don't have 12 different delivery vans dropping at my door on a Wednesday", or "please deliver using a sustainable delivery service".

Some customers are absolutely willing to pay for e-cargo bike delivery in cities, but don't get to choose who delivers their parcel if they're ordering from further afield. This is where a connection to urban rail freight, supported by e-cargo bikes at either end, could compete. A fully sustainable end-to-end parcel service would be very attractive to retailers whose customers are prepared to pay a premium for their eco-friendly goods.

Co Delivery is part Co Cars, Co Bikes, Co Delivery



Leading the march to decarbonise logistics with a high-speed, all-electric rail solution

Varamis Rail

Can you tell me a bit about Varamis Rail?

Essentially we are the UK's newest Freight Operating Company leading a radical return to deliver an 'all-electric' solution to parcels and light goods distribution on the UK rail network. We want to be part of the move to creating an urgent and necessary modal shift of goods transportation from road to rail in this country. In the current climate, our service offering is not just desirable but essential.

Where are you operating?

Ultimately we plan to introduce a rail logistics operation along the West Coast Main Line rail corridor linking Central England & Scotland, before expanding operations quickly to London. We intend to operate one train between Birmingham and Scotland this year, and then expand this service to London in early 2022. Next year we expect to develop additional services between Scotland and London along the East Coast Main line rail corridor, ultimately creating a circular network around the UK's current electrified rail network, delivering parcels to major towns and cities.

And how is Varamis moving these goods?

Varamis Rail's aspirations are to keep their new operations simple, quick, and carbon-free. We aim to utilise a fleet of re-purposed all-electric multiple units formerly used in passenger service; removing the seats and tables and replacing people with parcels. What we carry and how we do it is entirely up to the customer. End-of-mile logistical solutions at either end of the rail journey is crucial, and building a relationship with our customers that embraces technology and change is key to our future success. Varamis Rail wants to integrate its service offering into their current methods. Collaboration is key, and our model is to work with customers at an early stage to build a service that suits their business needs. We can offer 4-sided, fully secure Foldable Lightweight Containers (FLCs) to move goods on/off our trains as shown below or we can utilise containers currently used by the customer within their business.

Why do you think that its important to consider the railway as an important part of the UK's drive to reach net zero?

The answer is simple; the trains & infrastructure are already in place to support not only the UK's green ambitions, but this means our business model is sustainable from the outset. Climate change is on the top of not only the UK's national policy agenda, but internationally too. Local authorities have been prioritising clean air strategies due to the impact of air pollution on human health. If industry at large is to support the UK government's target of net-zero emissions by 2050, or now even earlier in most cases, as the recently updated ambition from government has outlined, then ambitious, carbon-free initiatives like ours aren't just desirable, they are essential. Every company has a carbon footprint, and we all have a responsibility to reduce emissions. Not only can Varamis Rail help organisations deal with complex issues around sustainability by 'offsetting' carbon emissions, but global carbon markets trading in Carbon Credits

are now increasingly used by industry. Our vision is to create a wholly-electric, end-to-end 'net-zero' carbon delivery service, which will include our trains being powered from 100% renewable sources. We actively engage with partners who share the same principles.

Long distance road vehicles struggle to handle the volumes that rail can offer and will always be behind the technological curve when it comes to taking the carbon out of the economy. We believe that the future in decarbonising the logistics sector is taking the 'trunk' mileage out of existing goods distribution with the use of high-speed electric trains supported by regionalised sustainable delivery systems into towns, cities or logistics parks. Our business model is not new. Varamis Rail has bold plans to eventually connect existing rail connected mail facilities that were built in the 1990s for exactly the same purpose, only now we believe that current shopping habits have accelerated the importance to let the "train take the strain".

What has been the reaction to your plans?

Varamis Rail has had many conversations over the last eight months with all the UK's leading parcel carriers, along with major supermarket chains, high street shops, hauliers and other logistic companies. There is a hesitancy to make that initial shift from road to rail and nearly every organisation we've spoken too would prefer to see a train running before committing to moving towards our new alternative distribution service. Varamis Rail hopes to offer that service very soon to give the logistics confidence in our service delivery. As well as high service delivery punctuality levels, the rail network also offers a closed and secure environment for moving goods, another attraction to using the railway as a whole. We are confident that as soon as these organisations see a train moving and powered by 100% renewable energy they will be clamouring to #GetOnBoard.

What needs to happen next?

Well, what we've found is that this is as much about changing perceptions and mindsets both in the rail and the logistics industry. The rail industry needs to embrace this model as both viable and entirely necessary as part of the UK's move to net zero. Similarly we need the logistics industry to see rail as a commercially viable and cost-effective alternative to road based delivery options. We understand that the UK parcels industry is intrinsically connected to a road-based network and a last-mile delivery system that integrates around local operators, so again, it's about a shift in mindset. This is beginning to happen, and we welcome the Rail Innovation Group supporting us to share this narrative, and encourage both sectors to embrace and support innovative approaches such as ours. Collaboration really is key to making this work for everyone.

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Why Cargo bikes? An analysis

Pedal Me

Cargo bikes are often faced with misconceptions about their potential and use for large scale logistics. In this article, Pedal Me, a London based e-cargo bike company, demonstrate the efficiency of e-cargo bikes in dense urban areas and emphasise their competitive advantage over cars and smaller vans for “last mile” delivery.

An e-cargo bike can carry up to 150kg, with trailers adding in an additional 150kg. The loads transported by Pedal Me around London are impressive—with customers often surprised by the volume and weight they can hold. Since the company started, Pedal Me has led an important research and development program to train riders into using cargo bikes at their full capacity in a safe and professional way. The curriculum, which involves on-road training, manoeuvring of the bike, loading, and navigation, is City and Guilds assured and trains riders to be predictable, professional, and communicative to other road users.

While studies point at a wide range of estimates for the proportion of van journeys replaceable by cargo bikes in urban areas (anywhere between 10–90%, although often in the lower ranges), we believe them to be a (usually) pessimistic take that underestimates the carrying capacity of e-cargo bikes.

We have looked in significant detail at the huge impact e-cargo bikes can have beyond more efficient logistics for making kinder and healthier cities. Beside the speed of movement, e-cargo bikes really benefit from shorter routes. In addition and perhaps more importantly for dense urban areas, e-cargo bikes do not need to waste time on finding a parking space. Parking is a considerable burden for delivery vans (studies show this takes between 9–15 minutes). They usually imply some additional walking to the final delivery point, as well as frequent parking fines (in the first quarter of 2013, FedEx and UPS owed NYC \$2.8 million combined in parking fines). The cost of finding parking means that many delivery drivers opt for longer walking distances between drops to avoid having to waste time on parking.

To measure the speed of the Pedal Me fleet, we collected GPS data from 37 bikes in September 2020 between 07:00 and 19:00. This corresponds to approximately 19,000 km ridden. In central London, the average speed of the bikes was of 15km/h. In inner London, it was of 16.4 km/h. What this shows, is that within a 3–5 miles radius of the centre, bikes are likely to move significantly faster than vans or cars. With congestion levels going up due to more cars on the road on one hand, and with more restricted lanes and continued investment in cycling infrastructure on the other, this advantage will only be heightened. The competitive speeds can be largely explained by the fact that cargo bikes can move past stationary traffic, are allowed to use bus lanes and benefit from separated cycling infrastructure.

Efficiency of smaller capacity vehicles in last mile delivery

The limited capacity of e-cargo bikes can be a deceiving aspect of their efficiency for large scale last mile delivery operations. During the first lockdown in the Spring of 2020, Pedal Me displayed the potential of e-cargo bikes by delivering over 10,000 packages in collaboration with Lambeth Council to the individuals and families most in need.

We have compared and contracted the delivery distances for client jobs, where the loads surpass the capacity of cargo bikes—as a way of showing how cargo bikes can outcompete vans despite their smaller capacity, meaning that cargo bikes are extremely competitive for larger scale logistics. Our analysis has showed shown that rather than being hindered by their smaller capacity, cargo bikes can result in globally more efficient routes for deliveries when the load is distributed between more vehicles. You can read the detailed analysis [here](#).

To summarise, we have seen that e-cargo bikes benefit from several advantages when compared to vans and cars: they move faster, they are able to park closer to drop locations without wasting unnecessary time looking for a space, and have shorter routes across the city. Finally, we saw that their smaller capacity (in terms of weight and volume) can lead to more efficient routes overall because deliveries are distributed amongst more vehicles (noting that this competitive advantage with vans can only be true if the available capacity of e-cargo bikes is used to their full potential).

Impact of e-cargo bikes on cities

When looking purely at logistics, e-cargo bikes have a clear advantage over vans and cars in dense urban spaces. However, the direct impact of cargo bikes goes far beyond the improved efficiency of urban logistics. The points below set out a London context, but the arguments can be applied, proportionally, to any densely populated area.

Decongesting the city

By removing unnecessary van and car journeys, cargo bikes have a huge potential to decongest cities. In the UK, congestion was estimated to have cost the economy £7.9bn. In London this corresponded up to £1,680 for the average road user.

Most energy efficient and least possible CO₂ emissions

E-cargo bikes are perhaps the most energy efficient vehicles. A study showed that an e-cargo bike uses 6% of the electricity of a small electric van. When comparing the life cycles of vehicles, e-bikes emit 95% less than the average car, and 85% less than an electric car. Because of the embedded CO₂, an e-cargo bike will have ridden well over 100,000 miles before an electric car is even out of the factory.

Lowest pollution emitters

Air pollution caused by traffic has been shown to have severe effects on people's health and direct effects on pre-births, dementia, lung cancer, heart disease among others. In London, 9,500 people die every year due to health complications related to exposure to air pollution. Each car in London costs NHS and society an average of £8,000 due to air pollution. Removing vans and cars is the most efficient way to reduce pollution in cities.

Noise in cities

Noise pollution caused by traffic and deliveries by vans, trucks and mopeds are a great source of frustration for residents. Noise pollution has direct effects on quality of sleep and stress. E-cargo bikes are nice and quiet!

Road safety

Trucks and vans are particularly concerning for urban streets, as they pose a disproportionate risk for pedestrians and cyclists. In 2018, there were 1,220 people killed or seriously injured between July and September due to road casualties. 99% of pedestrian collision deaths involve a motorised vehicle.

Reclaiming street space for people

Cars are extremely inefficient use of space in cities. London has 6.8 million parking spaces and the average car is parked 92% of the time. Some of this space is already starting to be reclaimed and has been used instead for outdoor seating areas for cafes and restaurants, pocket parks and social space. A single car space can be replaced by 10 bikes and evidence suggests that bicycle parking infrastructure delivers five times higher retail spend than the same area of car parking. Inefficient use of space is not only true for parking. In Copenhagen, bikes are used for 62% of commutes, yet get 7% of space. Cars are used for 9% of commutes, yet get 54% of space. A Transport for London study showed that bike lanes are five times as efficient as vehicle traffic lanes in terms of moving people.

Support for active travel infrastructure

The simple fact is that there are too many cars in London driving short distances; with 50% of journeys being less than 3km. By desisting last miles logistics from motorised vehicles, e-cargo bikes offer a further incentive for better cycling infrastructure to encourage active travel. On top of this, taking cars and vans off the road by replacing their journeys with cargo bikes means the roads are safer. This is a direct catalyst for more people cycling, which in turn means taking more cars off the road.

Entertainment for the city

The Pedal Me rider motto "Everyone Rides" still reigns strong. The most striking experience is perhaps the smiles that cargo bikes bring out from people in the city. While this argument is difficult to fit in a quantitative demonstration, it may well be the most convincing point for many.

You can find out more about **Pedal Me** and statistical references used at <https://pedalme.co.uk/>



Working to create opportunities for increased logistics traffic by rail

Network Rail

As an organisation we have been changing our culture to one which is open for business. We want to be easier to engage with and flexible in our approach.

Network Rail have recognised the growth opportunity in light logistics by rail, and we welcome the opportunity to work with new, as well as established freight and passenger operators who have an interest in expanding into logistics by rail.

We recognise that this emerging opportunity for increasing logistics transport by train is not limited to one type of solution. There is likely to be a range of different modes of transporting logistics by rail, ranging in scale from:

- **Express Freight as Passengers** – for example, using space on a lightly loaded intra-peak passenger train to cater for parcels

- **Inter Urban Express Freight Services** – dedicated trains (converted passenger rolling stock) which move parcels and logistics between stations or distribution centre to station, like existing Royal Mail trains
- **Trunk Logistics Services** – dedicated trains (converted passenger rolling stock) which move parcels and logistics between distribution centres

The logistics sector has an impact in a number of different areas across Network Rail, from working with station colleagues in understanding how we can handle the different modes of express freight logistics at our stations, to creating the necessary space in the timetable to include new train slots.

1. Space on Passenger Trains

Express Freight as Passengers

- Regular, in service passenger trains providing space on trains for parcels at times where passenger numbers allow.

2. Dedicated Train into Station

Inter Urban Express Freight Moves

- Delivering parcels and logistics into the heart of cities using passenger stations as transfer point for final mile
- Unique selling point is speed of delivery to city centre.

3. Dedicated Train into Distro Centres

Trunk Logistics Moves

- Depot to depot logistics moves – competing with road haulage moves
- Road vehicle final mile
- Speed and environmental considerations.

Network Rail is looking at the suitability of each of our managed stations to see how so we can accommodate express freight. This includes looking at elements like storage capacity, access for onward distribution and engineering plans. This will give us an indication of how ready some of our infrastructure is to add new flows of logistics into the existing operation of the network. It will also allow us to consider what elements might need to change to enhance the offer to customers who wish to use the existing rail network as part of their logistics supply chain.

Another area that we are keen to explore is how we can build on our existing freight estate and harness several of our sites across the UK including many in large cities or near onward distribution hubs. Ultimately, the central urban destination station could be an existing passenger terminus or a dedicated urban distribution facility with integrated rail docks.

We've already started to make progress in this area as Route Freight Manager Chris Constable describes here:

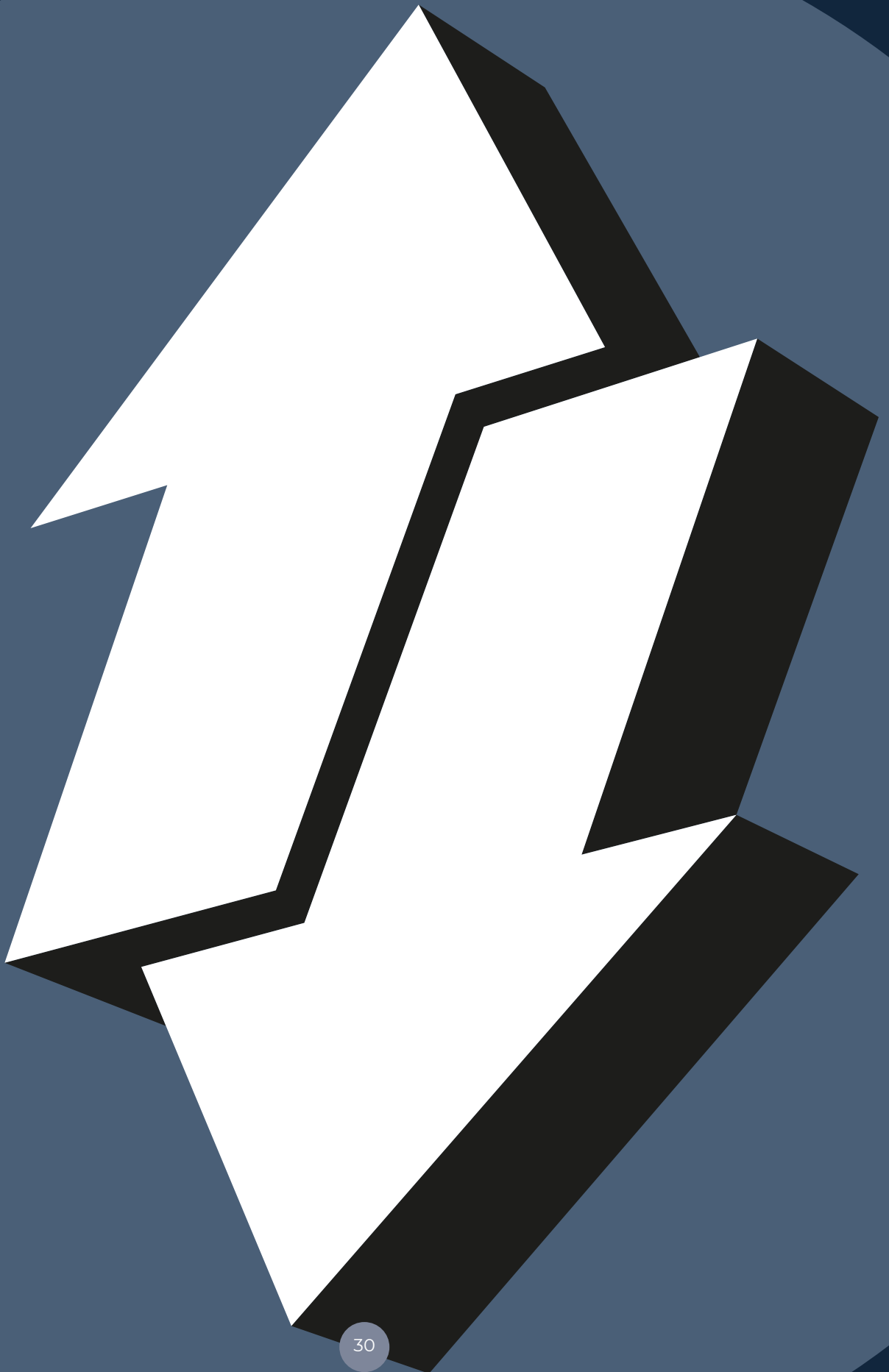
"I used to be a mail train driver and it's been a pleasure to work on bringing back light goods to stations which was traditionally a part of the role. We've got the ball rolling at Bristol Temple Meads and I've helped establish contacts at both Network Rail and Great Western Railway station management to support this exciting new initiative. I like to think I've helped open people's minds to this concept.

Intercity Railfreight have been successfully delivering urgent medical supplies amongst other things for a couple of years now. As part of the plans for expansion, I attended a 'roll cage' trial at Bristol Temple Meads station last year and it showed that we have the space in the Milk Tunnel and that CrossCountry High Speed Trains destined for Leeds can accommodate them. I believe Intercity Railfreight have already put down roots not only here but across the Western Route and wider parts of the country. It's a fantastic opportunity for stations to be so much more than onward destinations and be hubs of service for their communities."

Express freight marks an exciting area for growth outside of our “conventional” plans for rail freight growth. That is why we have a dedicated resource on the team looking after existing and potential customers. A key part of the role is to manage the interface with passengers and passenger operators and to make sure that the two can work together symbiotically and that one does not impede on the customer experience of the other.

The contribution the freight logistics sector can make in terms of moving the industry towards the target of achieving net-zero by 2050 is significant.

The future looks bright for express freight and the emerging industry should feel like they have the infrastructure manager in their corner, aiming to support growth in this key and fast-growing sector.



In summary

Achieving and expanding this bike-rail-bike-home concept would help to decarbonise the wider logistics sector, and it would reduce congestion and air pollution in towns and cities across the country. Who else but the rail network could speed your fresh goods to your customers at up to 225kph?

We have found existing examples of parts of this end-to-end model, but this is just the start, we want to work across the rail sector to help build an attractive offer to the logistics sector that makes commercial sense and helps them to meet their corporate commitments.

As our cities adapt to support active travel and meet their net-zero ambitions and responsibilities to reduce air pollution, with the introduction of cycle highways and low traffic neighbourhoods, an E-Bike can access areas both quicker, and far more sustainably than current delivery vans. Parcels as passengers will accelerate the delivery of a low carbon distribution network.

Benefits to Rail

1. Increased revenue opportunities
2. Reduce government subsidies
3. Meet requirements of the modern economy—if more people are going to work from home
4. Better use of infrastructure we already have.

Benefits to Logistics

5. Making use of an existing nationwide network.
6. Reliable journey times
7. City centre hubs
8. Efficient last mile forwarding
9. Supports sustainability requirements.

Benefits to all of us

10. Reduce pollution—cleaner air.

Fewer light goods vehicles in residential neighbourhoods

11. Calmer city streets
12. Reduced subsidy for passenger rail services
13. Same-day delivery for more products
14. More local employment opportunities.

So what is needed to embed this hybrid model country-wide?

In advance of COP26, many organisations are making commitments on how to reduce their contribution to climate change, now is the time to draw in stakeholders to secure this green operating model. Strong cross-industry leadership is needed to work across traditional silos and embed the model in policy and land use planning. In the short term, industry could work together to secure a “train-based delivery” accreditation. Retailers who use the bike/train based delivery service could be recognised for their green choice.

Rail operators could help by making the network more available to potential logistic customers, they could create inventories of space available onboard. Station managers could welcome carbo bikes, and create safe physical routes to transfer goods in the station.

Now is the time to work together.

Our thanks go to all who contributed to this paper for sharing their insight with us and allowing us to build a bigger picture of what’s happening in the sector, and what is possible if we work together!

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