Rail Forum Route Zero 2

RAIL SUPPLY CHAIN DECARBONISATION

2nd Edition
November 2023

Rail Forum

Foreword

Rail Forum's 2nd edition of the Rail Supply Chain Decarbonisation brochure builds on the initial publication and showcases further solutions that help decarbonise the railway to meet net zero targets.

Members are at the heart of what we do, and we are committed to ensuring that we support them on their carbon reduction journeys.

There are lots of great steps being taken by members to decarbonise, and we thank all the contributors – with case studies from the first edition, updated entries and a host of new submissions, we hope the solutions featured inspire further organisations both within rail and cross sector.

Elaine Clark
Chief Executive Officer
Rail Forum

Foreword

The week which featured the 2023 Rail Forum annual conference in Birmingham was, for me, an eye opener – in a good way! Not only did I see the resilience of the rail supply chain up close at the conference, but it allowed me to pop over to Solihull the next day to see its ingenuity on display at the Rail Innovation Exhibition. There, some of the projects, receiving funding through Department for Business and Trade support of the Global Centre of Rail Excellence, updated me on the amazing things they're doing to help propel the decarbonisation agenda in rail infrastructure.

The timing was apt because from 1 November 2023, The Environment Act 2021 requires ministers to have 'due regard' to the Environmental Principles Policy Statement. It's about embedding environmental principles in policies across government – new ones as well as existing policies if they are significantly revised. And if there's one thing rail reminded me of during the week Rail Forum's annual conference took place, it's that saving the world is cheaper than ruining it. Having read Rail Forum's 2nd edition of the Rail Supply Chain Decarbonisation Brochure, I hope you'll agree that the sector knows how to help do it!

James Brewer
Head, Rail Supply Chains
Department for Business and Trade

Rail Forum Route Zero 2

Rail Forum members showcased:

Decarbonising the railway to meet net zero targets

There's no denying modal shift can play a pivotal role in the shift to Net Zero. Research from The Rail Freight Group states that one freight train is the equivalent to 76HGVs; this represents a reduction in CO^2 emissions of up to 76 per cent compared to road.

Alternative fuels and electrification of all routes can help to bring further environmental gains, but could take a while to see the impact. In the meantime, it's essential the rail industry focuses on incremental changes to achieve long-term environmental success.

Digitalisation as a means to be green

At 3Squared, our ethos is centred around helping our clients become safer, more efficient and greener through digitalisation and moving our industry closer to the Net Zero goal. To illustrate, 3Squared's recent cooperation with HS2 has seen us help teams transport materials more efficiently and therefore minimise environmental impact through the implementation of our digital technology. BulkSmart, a module that sits under our RailSmart suite of products, enables clients and freight operators to fully manage their supply chains and operations digitally from anywhere in the UK. Among the key features are full visibility of the freight supply chain, live performance, cost management information and real-time operational control data.

This is just one of the digital tools developed by 3Squared that is making a tangible difference to the rail industry's carbon footprint. Our virtual driver training for the East Coast Digital Programme (ECDP) is another key piece of software supporting digitalisation, and modal shift in the industry.

Managing competencies remotely to save on paper, travel and fuel

Our RailSmart Employee Development System (EDS) is a competency management system that is helping to save on paper, travel and fuel. Designed to aid companies in maintaining safe, compliant working practices, it enables managers to digitally monitor the mandatory skills required by employees to perform their roles. The software helps to reduce paperwork by keeping everything in one digital hub, whilst also removing the need for teams to travel up and down the country to conduct assessments and review files.

Helping to facilitate modal shift through PathPlanner

Our dedication to building a digital railway and supporting the decarbonisation strategy means we are passionate about making the transition to modal shift work effectively. 3Squared's PathPlanner tool helps to promote the modal shift model by increasing rail freight usage across the network. By uncovering unused paths, it allows freight operators to find gaps in the timetable which they can fill. In turn, this decreases the time they would be sat in depots waiting for a space and using up unnecessary fuel.

Green ways of working in the office

Our commitment to sustainability is not only limited to our product development, but is also mirrored in the office. From recycling all waste and encouraging staff to take up our cycle to work scheme, to supporting local business and embracing hybrid working, sustainability permeates all aspects of our operations, both in-house and client side.

To find out more about our solutions,

Visit our website and get in contact with our expert team today on **3squared.com** or email us via **hello@3squared.com**

Spearheading sustainability initiatives

Altro manufactures high performance safety flooring for the passenger transport industries with particular focus on global rail and bus. Based in Letchworth Garden City, England, Altro was established over 100 years ago and amongst other accolades is credited as being the inventor of safety flooring and the first to introduce them in the transport sector.

Through the course of its long history the company has been shaped by a drive to innovate and a philosophy of continuous improvement. Maintaining this forward-thinking approach has been critical in how Altro is addressing the environment and decarbonisation.

The company's passion for sustainability has seen it spearhead a variety of initiatives including the co-founding of Recofloor – a take back scheme which diverts waste material away from landfill to be put back into flooring or recycled into other products.

This scheme alone has seen the business recycle more than 6,000 tonnes of vinyl flooring over the last 12 years. This translates into a saving of 7,041 tonnes of CO2 or the equivalent of taking 1,838 cars off the road. In fact, along with the company's in-house recycling capability, Altro's manufacturing plant in Letchworth has sent zero waste to landfill since 2014.

Altro ensures that it selects the highest quality raw materials, sourced exclusively from suppliers with ISO 14001:2015 certification or those who can demonstrate their environmental commitment. This is further backed up by continuous optimisation of manufacturing processes to ensure efficiency and reduce energy consumption. Adhering to this approach has enabled Altro to reduce its water consumption by a staggering 99% over the past 20 years.

Beyond its own manufacturing processes, decarbonisation has also greatly informed the development of Altro's products and services. Acutely aware of the enormous role public transport will play in reducing carbon emissions, the company has gone to great lengths to ensure its floors consciously contribute towards these goals.

With energy efficiency and charge range a crucial concern for fleet operators, Altro has reduced the weight of many of its transport floors by as much as 20% in recent years to ensure no vehicle is forced to carry unnecessary weight.

To complement its lightweight product offer, Altro has also pioneered a suite of installation services designed to support the sustainability targets of customers. From the reduction of material waste to enhancing fitting efficiencies, Altro's installation services are changing the way vehicle interiors are assembled.

Looking ahead to 2030 Altro has outlined an ambitious set of targets including further reducing its carbon footprint for all facilities with a view to becoming carbon neutral through increased efficiencies, renewable energy, and carbon offsets. Other targets include developing an ability to offer circular economy solutions, provide adhesive-free options in all floor ranges and achieve 30% recycled and bio-sourced content in their product portfolio.

After 100 years of innovation Altro remains as committed as ever to advancing transport floors to contribute to a bright, sustainable future for all.

altro

Sustainability

Altro - our mission to build better futures

We are committed to develop and innovate from within, reducing our carbon impact, supporting the wellbeing of our international teams and improving the quality of life for more vulnerable communities around the world.

2% of all global **profits** annually are **donated** to the Altro Foundation

In 2020, Altro championed the Starfish Greathearts Foundation to support the Wellness Wagon Mobile Clinic

40 In 2021, Altro had 40 employees with over 25 years' service

Altro employees can spend one day per year providing voluntary support to local **charities**

Reducing our carbon footprint

Roseflor have collected 6,000 tons of waste vinyl flooring resulting in 7,038 tons of CO_2 savings

109.10 tons of carbon saved by diverting waste from landfill

99% reduction in our manufacturing water consumption since 2000

100% certified green electricity provided by our UK energy provider

Product development

97% of our floors products sold in 2021 contained bio-based and/or recycled content

0% lead, cadmium, mercury or hexavalent chromium in our safety floors and walls

100% ortho-phthalate free vinyl floors

100% of Altro construction safety floors contain a bioplasticiser which comes from corn

Recycling

Pioneers of floor and wall recycling schemes

Our safety flooring is wrapped using 100% recyclable packaging

0% waste to landfill at our Letchworth site

Altro PVC-based products are 100% recyclable pre-installation

Altro walls are 100% recyclable

100% of our waste is recycled or waste to energy recovered at our UK manufacturing site

To find out more, please visit www.altro.co.uk/Sustainability

Supporting rail freight decarbonisation

Argenta are undertaking a project to support the decarbonisation of the Rail Freight industry that will enable a step change increase in their ability to perform remote condition monitoring. The aim of our project is to prototype a method for harvesting energy on freight wagons that can be utilised to perform analysis that will allow better understanding of a freight wagon's condition.

Application of true condition-based predictive monitoring of rail freight wagons will not only have tremendous benefit to rail freight operators in reduction of maintenance costs, but will also have direct and indirect impacts on total carbon output.

Direct:

- Real-time wagon brake condition detection can avoid running wagons with brakes on or partially on. This will drastically reduce the power necessary to pull the wagon.
- Early detection of bearing failures will allow intelligent replacement of bearings before they fail. Failing or failed bearings lead to increased fuel consumption and wheel flat-spots.

Indirect:

- Early detection of nascent wagon problems will allow optimised scheduling of fleet maintenance. This will reduce the number of breakdowns on the line and subsequent maintenance call-outs with road vehicles.

Sustainability in branding

Sustainability is a key aspect of CSR in every organisation and Aura is no exception.

At Aura Brand Solutions, we pioneer innovations and collaborate with suppliers and customers to lead by example with our business practices and offerings. Our environmentally conscious approach is reflected in our Sustainability Pledge and CSR report.

Throughout the last year, focusing on ethical sourcing, decreasing our carbon footprint, exploring offsetting and minimising waste has allowed us to reduce our environmental impact and become a more environmentally conscious business as we progress on our path to net zero.

Our GreenBrand portfolio comprises many sustainable solutions such as RE:CYCLE and RE:SIGN. Ideal for station branding, RE:SIGN reuses existing hardware to create new signage, reducing production and consumption of new materials.

Along with our extensive rail refurbishment services, RE:SIGN reinforces our refurbish not replace ethos, encouraging reducing, reusing and recycling wherever possible. Promoting our more sustainable branding solutions allows the environmental benefits to be passed on to our customers.

We work hard to champion state-of-the-art solutions in the rail industry that reduce environmental impact and the rail sector is making some huge advancements in the name of sustainability. We've been privileged to support several of these revolutionary projects during 2023:

A full wrap using PVC-free film for Chiltern Railways HVO (Hydrotreated Vegetable Oil) powered Class 68 train which can reduce greenhouse gas emissions by up to 90%.

A full non-PVC wrap for Porterbrook's new HydroFLEX hydrogen powered train which generates electricity from hydrogen and oxygen in the air.

Branding the new fleet of Drax Group biomass wagons manufactured by WH Davis. Biomass is a source of renewable electricity offering a secure energy supply, which reduces the UK's reliance on fossil fuels.

2023 has also seen us partner with Whoosh to deliver their real time journey dashboard via dynamic QR codes. So far, we've rolled out QR codes on seatbacks and tabletops for GWR, SWR, LNER, and throughout 20+ stations in conjunction with network rail, with plenty more to follow. This innovative solution aims to improve the passenger journey, make journey information instantly accessible and encourage commuters to choose the more sustainable option of rail as their preferred method of transport.

Sustainable Surface Technology

Sustainable Alternatives to Solvent-Based Cleaning. For more than 35 years BIO-CIRCLE has been using a combination of technology, chemistry, biology and service to optimise cleaning processes, lower environmental impact and increase the health and wellbeing of users with their range of parts washers, cleaning systems and liquids.

BIO-CIRCLE transforms the 'old way of doing things' into efficient, streamlined processes that are cost and carbon conscious. Leading the way on environmental awareness, the company introduced environmental management early on in 1996 with ISO 14001 - currently certified by Lloyd's Register Deutschland GmbH. BIO-CIRCLE has also been audited by EcoVadis since 2019. EcoVadis is an assessment platform for evaluating corporate social responsibility and sustainable procurement, and many companies choose to work with EcoVadis to improve the sustainability of their global supply chain. BIO-CIRCLE's ethos is to think holistically and act sustainably, and so the entire life cycle is considered in the development of their cleaning systems and liquids, and passed directly on to their customers.

In production - BIO-CIRCLE uses sustainable raw materials where possible and generates most of the energy required for production in-house from a number of green sources - a photovaltic system at the production site in Germany, hydroelectric power, wind and solar energy, biomass and geothermal energy along with plastics from recycled PET, that are also recyclable.

In application - BIO-CIRCLE cleaning liquids are packed with sustainable credentials:

- VOC-free or VOC-reduced, yet powerful cleaning and a direct substitute for solvents, which hugely contribute to indoor and outdoor air pollution. BIO-CIRCLE liquids contain micro-organisms that break down grease and oil via bio-remediation - a natural process that does not emit high levels of VOCs.
- Water-based and free from hazardous chemicals - BIO-CIRCLE liquids do not contain any substances from the current EChA Candidate List of Substances (REACh).
- No labelling required under the CLP Regulations which hugely reduces or completely eliminate the waste chain, specialist training and having to meet compliance requirements.
- Do not contain any chelating agents, so deposits of strong chemical compounds that may endanger the environment are avoided. Instead, renewable surfactants with a high and fast biodegradability of plant origin are used.
- Energy efficient - a number of BIO-CIRCLE cleaning liquids work optimally at low temperatures.

In disposal - Waste reduction and prevention play an important role in waste disposal. BIO-CIRCLE cleaning systems are designed as recirculation systems, which guarantees a longer service life of the cleaner, reducing or entirely eliminating waste and saving resources.

BIO-CIRCLE evaluate their customer's existing processes and then provide a bespoke set of systems and liquids to vastly improve them, for the lowest impact on the environment as possible, improved occupational safety whilst still maintaining cleaning efficiency.

1 Customer replaces corrosive cleaner with VOC-free cleaner to clean electric train motors

CLEANING APPLICATION: Removing grease, oil & brake dust from electric motors
EXISTING CLEANING PROCESS: Corrosive cleaner.

THE PROBLEM WITH THIS: Health, safety & environmental issues. Hidden costs, especially in relation to compliance, storage and specialist disposal. Uneconomical and not energy efficient. High turnover of cleaner used.

BIO-CIRCLE CLEANING PROCESS: STAR FUTURE V manually applied with a foam applicator.

THE RESULT: Assisted meeting decarbonisation goals as STAR FUTURE V is VOC-free and water-based.

2 Customer replaces bucket of solvent with BIO-CIRCLE automated Hot Wash system and VOC-FREE cleaner for a quicker, more efficient and decarbonised clean.

CLEANING APPLICATION: Removing grease, oil & dirt from small-medium sized parts, generally less than 50 cm wide, multi-material (carbon steel, aluminium).
EXISTING CLEANING PROCESS: Manual cleaning. Solvent in buckets is used and the parts are cleaned one by one with rags. Physical effort is required, with the operator standing in the same position for long periods of time. It takes 2-3 times longer to wash the same amount of parts. Solvent has a very high VOC content.

BIO-CIRCLE CLEANING PROCESS: Automatic cleaning in a HTW with ALUSTAR 100 a water-based degreaser diluted at 10%. The operator only has to spend 5-10 seconds to set the washing parameters and 1 minute to load the parts into the washer. The washing time is adjustable with 15 minutes proving suitable to wash 20-30 parts at a time, depending on the size of the parts. One load of liquid into the parts washer can last 3 months.

THE RESULT: Huge reduction of VOCs into the environment from the facility, along with an increase in productivity, safety, reduction in PPE costs and a better, more standardised cleaning result.

To arrange a site survey, please call 03300 415 396 or email sales@bio-circle.co.uk

Eco-friendly shunting with hybrid locomotives

Clayton Equipment, a major supplier to the UK rail industry for many decades has the potential to transform the railway, making journeys cleaner and greener by cutting CO2 emissions even further with our zero emission locomotives and is well positioned to work with the industry to achieve a net zero rail network by 2050.

Our next generation battery locomotives offer significant benefits - zero emissions, maximum CO2 reduction, no fumes inside workshops, low noise (increasingly important near residential areas and for 24/7 operations), lowest operational and maintenance costs, regenerative braking resulting in reduced brake wear and recharging time, operational on-board or depot-based battery charging. Key advantages when needing to decarbonise transport rapidly.

As battery performance and costs have significantly improved over recent years, battery powered locomotives become more commonplace and their use in battery and hybrid rolling stock has become increasingly attractive.

Clayton continues to play a part in the decarbonisation journey with the most extensive range of battery locomotives on the market offering a sustainable efficient approach to railway shunting.

The highly developed Class 18+ CBD90 Bo-Bo locomotive, is self-contained and powered by an on-board battery that provides an emission-free operation where charging facilities are available. The locomotive's regenerative braking system recharges the unit on the move. In off-grid operations when challenges with range or operation occur, an efficient on-board Stage V compliant diesel engine helps increase the locomotives running time.

This locomotive offers customers a greener and sustainable option for rail freight operations in the UK against the backdrop of targets to reduce emissions.

Clayton has built 15 90-tonne, 20km/h 416kW Bo-Bo locomotives at its Burton Upon Trent factory with ability to haul up to 3,000 tonnes for Beacon Rail Leasing.

These CBD90 hybrid+ shunting locomotive operate economically while reducing environmental impact and conserving resources using green technologies to constantly set new standards, it has the power to play a key role in reducing emissions and working towards the UK decarbonisation targets. With a fast-changing environment with increased demand for lower emissions, new technology, more capacity and cost-effective assets, Clayton Equipment in partnership with Beacon Rail will serve to meet this demand with its battery-powered equipment, which will not only provide for environmental benefits but will allow customers to realise costs savings over time in terms of fuel consumption.

Decarbonisation: reduced material & energy waste; rail vehicle & infrastructure use benefits

Composite Braiding Ltd (CBL) offers light weight, affordable advanced composite components that are key enablers to decarbonisation and sustainability.

There was a gap in the market for higher-volume, lower-cost components made of composite materials such as carbon or glass fibre. The weight advantages are well-know and directly reduce CO2e and other emissions, but CBL has developed a process that makes structural composites available at prices often similar or even better than their metal counterparts. We will now concentrate solely on the decarbonisation and sustainability aspects - the Route 2 Zero.

CBL has delivered benefits in the following areas:

Material Waste Reduction

We have reduced production material waste from around 5%, to under 1%, by re-using and repurposing that waste into products complimentary to our existing offering. As we use thermoplastic composites, the same principles exist for end-of-life products. We are delivering circular economy benefits, and will keep working to improve this.

Energy Waste Reduction

We have developed a process that manufactures parts with high levels of automation and in very quick times. For example, we can produce a 4m long, 250mm diameter beam in under 15 minutes, with a 95% reduction in energy used vs oven processing. This becomes under 5 minutes and savings of 98% for smaller parts. That's a huge reduction in energy used and directly delivers decarbonisation.

These infrared pictures illustrate this. You could even touch the outside of our tooling while it is at full operating temperature. It's very light too.

Decarbonisation in Use - Vehicles and Infrastructure

It is accepted that weight reductions directly translate to reductions in CO2e and other emissions in rail vehicles. We are seeing these materials being adopted in electric vehicles for example.

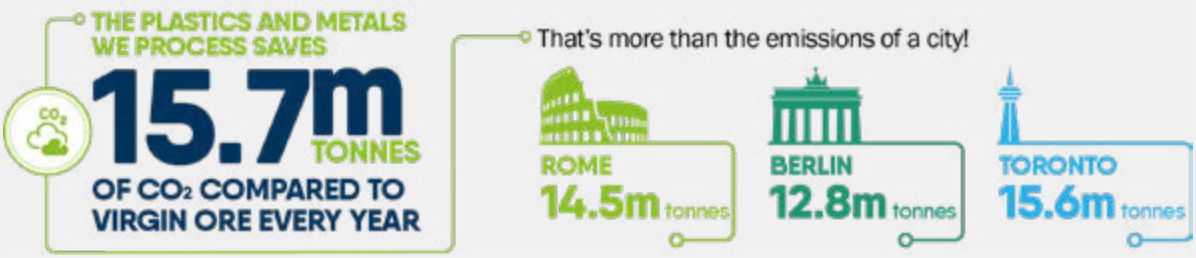
However, they also deliver great benefits in rail infrastructure. It's easier to transport and install, with weight reductions of up to 70%. In one example for over 3000 structural poles, we saw that the benefits in manufacturing, transport, installation (reduced plant size and much less possession time) and reduced maintenance equated to over 7700 tonnes CO2e savings. That's clearly a great benefit.

Helping you drive the rail industry forward

Helping you drive the rail industry forward

Extending the lifecycle of the items we receive through reuse and recycling

At EMR, our purpose is to create a future where the materials we use are not extracted from the planet. We recycle anything from a can to an aircraft carrier, putting vital resources back into the circular economy.



Providing a circular economy across the rail sector

As a global leader in sustainable materials, we optimise recycling rates through reuse, recycling and repurposing. We've committed to becoming net-zero by 2040, as well as helping our partners to meet their own sustainability goals.

With a global network and over 60 sites across the UK, as well as regional rail decommissioning hubs, we are dedicated to minimising carbon produced through transportation. We've reconsidered how we move our materials around the world, favouring less carbon-intensive methods of transportation, such as rail and sea wherever possible.

Our dedication to drive forward the recycling industry puts innovation at the forefront of what we do. As part of this, we collaborate with key industry stakeholders, government and academia.

In our drive for sustainability, we have developed new processes to support the production of high specification materials, forming our range of innovative sustainable products.

Why choose EMR as your perfect partner?

Get in touch to find out why we are the sustainable partner you can count on.

stephen.drag@emrgroup.com

Carbon Assessment Tool

Over recent years there has been an increasing awareness about carbon assessments in the rail sector and subsequent mandatory requirement to undertake carbon assessments on some projects.

We understood that as a design consultancy we can make the largest impact on carbon reduction by developing low carbon options at design stage.

We realised that there was some confusion in the industry regarding carbon related terminology such as embodied, capital or whole life carbon. We also observed that many suppliers were marketing their products as being 'green' or 'low carbon' without having anything other than qualitative or theoretical evidence to support their statements. This seemed particularly prevalent with suppliers of more modern, innovative ancillary civils type products. As a design consultancy that provides a significant amount of design for signalling related/ ancillary civils this was problematic not only for us but for our clients.

We set about undertaking a quantitative carbon assessment to identify the least capital carbon options for signalling/ancillary civils assets, comparing Business as Usual (BaU) products, materials and methodologies against more modern or innovative options. Twenty of the most commonly used asset types were assessed ranging from troughing to UTXs to signal foundations. To undertake this assessment, we worked closely with several suppliers and contractors.

To undertake this assessment, we created our own carbon assessment tool that meets the requirements of NR/L2/ENV/015 'Environment and Social Minimum Requirements' as well as EN15978 'Sustainability of Construction Works' and the Royal Institute for Chartered Surveyors (RICS) 'Whole Life Carbon Assessment for the Built Environment'.

FJD Consulting were awarded 'Carbon Champion' status by the ICE last year for this work, making us one of only twelve companies to achieve this status and having four of the twenty-seven named individual Carbon Champions in the UK.

We have since continued to develop this tool further, again working closely with industry suppliers and contractors. The tool can be used to assess both individual products and whole projects with new features such as a postcode lookup to automatically calculate travel distances. The tool allows for either capital carbon assessment or whole life carbon assessment through all stages of project development from feasibility through to as built whether GRIP, PACE or any other assurance process is followed.

We have learned so much about carbon assessment over the last few years and have made some enlightening discoveries along the way. We will continue to develop our knowledge in this area to reduce the carbon emissions associated with projects in the rail sector.

One Million Better Workdays: nurturing mental health and the environment

Leadership, sustainability and mental health: these are the three principles underpinning Ford & Stanley which we apply throughout every aspect of our business as a recruitment and talent specialist.

Our mission 'One million better workdays' has been born out of that, a tangible objective to ensure we're proactively supporting occupational mental fitness as well as NetZero.

In partnership with landowners' estates across the UK, 'A Tree for Every Placement' is our initiative to plant trees covering a total of 35,000 acres. Each time we make a permanent placement with an employer, through our Better Workdays Trust we will match-fund to cover the cost of purchasing, planting and certificating an oak tree. Oak trees live up to 1,000 years and their contribution to landscapes, biodiversity, culture and economy is enormous. They are a haven for a colossal 2,300 wildlife species, providing vital spaces to eat, shelter and breed.

As part of this same mission, we have a three-acre site in Derbyshire dedicated to conservation, teamwork, and mental wellbeing. Research shows that individuals spending time in nature report improved wellbeing, which is why the Ford & Stanley Conservation Meadow has been designed to inspire people to embrace nature for the benefit of both mental health and the environment.

It has become a mecca for wildlife and features a floating wetland, marking the culmination of many, many hours of collaborative and committed efforts using and repurposing single use plastic bottles and other items to help build it. The floating eco island has become a thriving habitat for nesting waterfowl, pollinators and other insects, improving ecology with plants, and acting as a natural water filtration system.

In July, as part of our agreement with CAF, the team gathered at the site for an afternoon to undertake maintenance and tree planting, which also proved to be an effective team building exercise. The project involved transplanting seedlings that were in trays and transporting them into individual pots, including 10 trees, on CAF's behalf. With 45 employees involved, the team spent a productive afternoon planting, strimming, and conducting maintenance to get the meadow ready for autumn.

We always look forward to our planned visits here as the team feel energised after doing something so rewarding for the purpose of the planet, further highlighting how much biodiversity and human wellbeing are connected. We're also helping to support our clients' sustainability goals, more evidence if needed on how many 'wins' are to be had from our One Million Better Workdays.

Find out more about Ford & Stanley's conversation work:

https://fordandstanley.com/conservation/

Supporting the decarbonisation of the rail freight sector

Frazer-Nash is delivering the Rail Safety & Standards Board's (RSSB's) project, T1229, 'low carbon freight traction and routes to deployment'. The project will predict the energy used by freight trains around the UK rail network, to enable an assessment of the freight traction scenarios that will support

decarbonisation of the rail freight sector. Frazer-Nash, a KBR company, is working in partnership with Lampada (University of Hull) and Direct Rail Services (DRS) to deliver the project.

The T1229 project assesses the adequacy of the power supply on third rail networks, which carry, or might carry, freight. It will identify the gaps, or deficiencies, that need to be addressed to enable freight alongside existing traffic. This includes identifying where there are similar inadequacies on the 25kV OLE network.

Modelling freight energy demand

Decarbonisation and mathematical modelling experts at Frazer-Nash are creating a model to capture the power, energy and CO2e intensity demand of freight corridors, based on a sufficiently representative set of freight movements/journeys, and the operational characteristics of freight and non-freight traffic across these freight corridors. The model is populated using NR+ data from the University of Hull, and validated using on train monitoring and recording (OTMR) data from DRS.

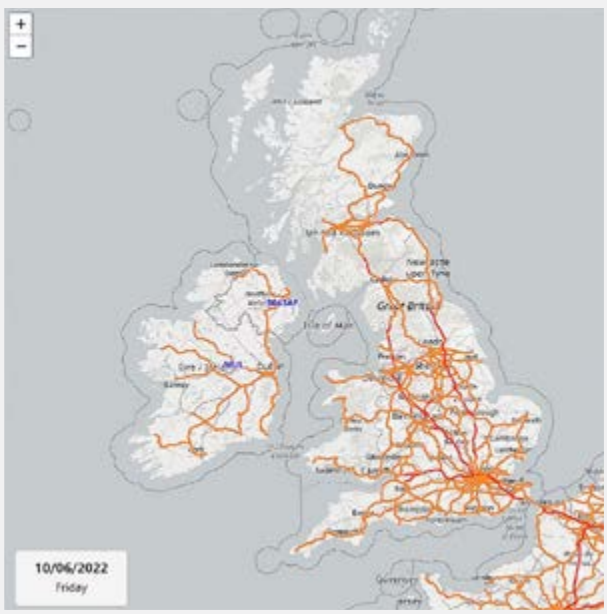
The validated model will inform a follow-on project to look at different traction option scenarios, such as partial electrification, the impacts of different low-carbon traction options on a non-electrified or partially electrified line, and the ability to model other elements, such as air pollutants, that may arise from different non-full electrification options.

Why Frazer-Nash?

Frazer-Nash was chosen for this project as we help to decarbonise the organisations, projects and infrastructure that underpin society. We support some of the largest, most technically complex organisations and projects in the world, helping them to understand, plan for and de-risk the transition to a low carbon economy and a Net Zero world. Our work is at the cutting edge of decarbonisation in sectors that are critical to national infrastructure, security and the economy.

Within the rail sector we blend our carbon analytics, systems engineering, mathematical modelling, technoeconomic assessment, technology management and strategic advisory capabilities with decades of rail sector experience to help our customers:

- Understand the carbon intensity of their operations
- Develop optimised, cost efficient, practical and science-based roadmaps / strategies to decarbonise
- Address the technical and engineering challenges required to deliver their decarbonisation roadmaps/strategies
- Assess, and prepare for, the risks and opportunities associated with a changing physical climate.



https://www.fnc.co.uk/sustainability/

Europe's leading centre for net zero rail innovation

What is GCRE – How can it support Net Zero

The Global Centre of Rail Excellence (GCRE) is a major new facility being constructed in South Wales that will become Europe's leading centre for net zero rail innovation. It will be a 'one stop shop' for testing new rolling stock and supporting world class research and development of new low carbon rail infrastructure, technologies, processes and skills – something that currently happens nowhere in the UK or on the continent.

The Strategic Gap in Rail Today

Rail is one of our critical national infrastructure assets and while we all rely heavily on the network, there has always been a missing piece of the jigsaw in rail testing and, particularly, infrastructure innovation. The UK and Europe lacks an integrated, single site facility to test new low carbon rail infrastructure, developments in rolling stock technology and innovative net zero technologies in a world class research and development environment. That causes a number of significant problems across the industry, with infrastructure design and innovation on the network being slow to move on owing to a lack of adequate testing facilities - something that is harming sector progress towards net zero.

What GCRE Will Do

Operational 24 hours a day, seven days a week, the GCRE facility will include two electrified test loops, one a high-quality rolling stock testing track and the other a unique-to-Europe track for infrastructure testing. GCRE will become the UK's first ever net zero railway, supporting the innovation needed to support decarbonisation and, crucially, helping lower the costs of major rail infrastructure projects. Located on a former open cast mine in South Wales the project will create long-term, high-quality jobs. GCRE will be designed to operate from the outset at net zero and will rely upon locally generated renewable energy.

The Public Policy Benefits of GCRE

Having a dedicated facility like GCRE will have multiple benefits for the rail industry and other, cross-departmental government objectives, including:

- Filling a Strategic Gap: Providing the UK and European rail industry with a single site for world class research, innovation and testing of new low carbon rail technologies
- Lowering Costs on the Railway: Supporting governments to lower the cost of major rail projects through earlier testing of new low carbon technologies before deployment
- Supporting the path to Net Zero: Contributing to the UKs path to Net Zero by 2050 through greater innovation and earlier testing of new products
- Long-Term Infrastructure Planning: Supporting the UKs critical low carbon rail infrastructure needs of tomorrow, providing security for the future
- Economic Growth: Supporting the creation of high quality green jobs and skills

Innovative weight reduction solutions

HARTING are constantly innovating products and solutions to drive advancements in transportation. There is an ongoing drive towards weight reduction within the rail vehicle construction sector as manufacturers strive to minimise energy consumption to improve efficiencies. One way of delivering savings is reducing the weight of components.

With the Han-Eco®, HARTING has developed new innovations for their industry standard Han connector series. The range contains a series of hoods and housings manufactured from high-performance, glass fibre-reinforced, polyamide plastic, that offer substantial weight savings compared to traditional metal connectors.

By switching from metal to Han-Eco®, you can achieve substantial weight savings of up to 50% per connector. These reductions may seem minimal compared to the weight of a train, but as connector usage in trains increases, so too does their proportion of the overall weight, making Han-Eco® an energy efficient choice.

As well as being lightweight, Han-Eco® also supports modular inserts, meaning data, signal and power options can all be combined into one standard-sized industrial connector. Not only does this make them versatile, but it also further reduces the space requirement for connectors within the train. Han-Eco® complies with standards IEC 61948 and EN 45545-2 HL3 and is fire-resistant according to UL94 V0. Furthermore, the Eco range is compatible with standard metal Han® B housings, meaning both variants are intermateable.

HARTING

Pushing Performance
Since 1945

HARTING can also produce project-specific jumper cable assemblies to suit your needs.

They have recently retained their prestigious Silver Quality Performance Level award from the International Railway Industry Standard (IRIS). Silver Performance is currently the second highest performance level issued by IRIS and is a significant achievement for HARTING, making them one of only two UK companies to receive Silver status. The HARTING manufacturing facility also holds ISO 9001 certification for Quality Management, the ISO 14001 Environmental Standard and UL certification for Wiring Harnesses ZPFW2 / ZPFW8.

To learn more about weight reduction in rail, please visit **https://www.harting.com/UK/en-gb/weight-reduction-transportation** or send an email to **salesuk@harting.com**.

80% Carbon Reduction on Platform Copers for Network Rail

Ibstock (Anderton Concrete) was approached by its customer, GTech on behalf of Network Rail, to develop a platform coper that would achieve the greatest reduction in embodied carbon possible, whilst still meeting the highest performance and safety requirements.

Ibstock implemented a three-stage plan to achieve these goals which was developed reflecting the core values of the Ibstock plc 2030 ESG Strategy which includes a 40% reduction in absolute carbon (Scope 1 & 2), with a further ambition of being Net Zero by 2040, and 20% of turnover revenue from new products and solutions that deliver customer value and improved sustainability:

Stage One:

Work within the current BS EN 8500-1 guidance to attain a mix with CO2e reduction. The reduction in eCO2 was in key stages – 20, 40, 50 & 70% and then as far as practical as to still demonstrate strength and durability.

Stage Two:

Use new technologies outside current guidelines CEM IIIC cements or Geopolymer.

Stage Three:

Review of design and development of materials.

Together GTech and Ibstock identified a number of potential methods for reducing the embodied carbon. A stepped innovation approach was carefully developed with each step providing additional carbon benefits that built on the previous one, by introducing lower carbon materials, and reducing the volume of materials through various design, analysis and manufacturing strategies:

Step One:

Replace 100% CEM I cement with a blended cement of utilising 28% Pulverised Fuel Ash (PFA), which provided an immediate 20% reduction benefit without needing to change the pre-casting production process

Step Two:

Change of replacement material to GGBS (Ground Granulated Blast-furnace Slag) which allowed for a greater increase in embodied carbon. Over a 12 month period the percentage of GGBS was increased from 36%, 50%, 70% and finally 80%, with each iteration having impacts on the process and performance.

Design life of product was increased from 60-80 years through raw materials selection and performance criteria. Coper thickness was reduced and innovative design features added to maintain performance. Current steel reinforcement design was revised and optimised to reduce the volume of steel required.

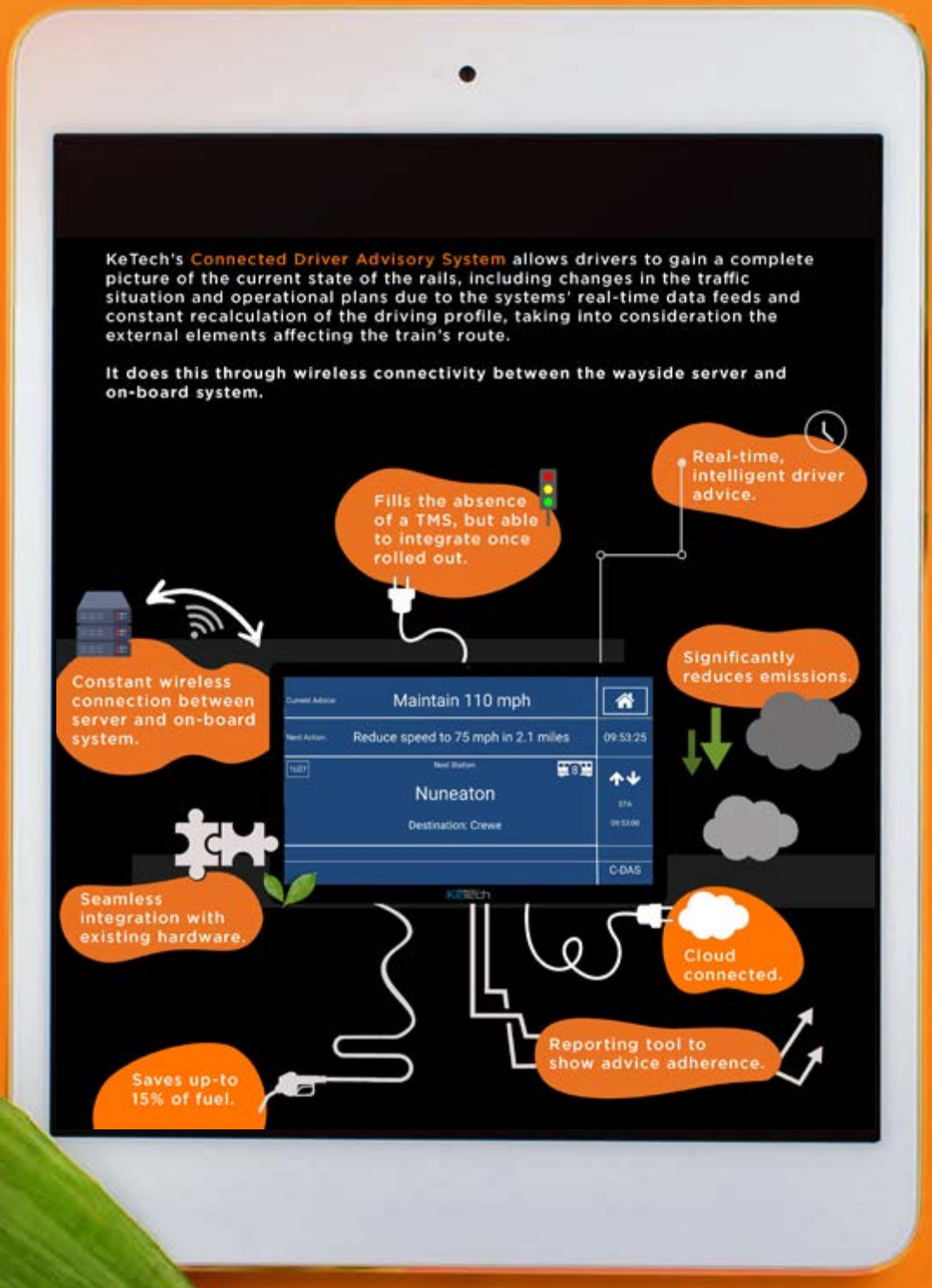
Additionally, a unique mix design blend was utilised with a bespoke manufacturing process to deliver this project which Ibstock and GTech believe can be utilised across wider product portfolios to support a diverse range of infrastructure projects.

Previous UK performance for state-of-the-art low carbon precast initiatives has seen 30-40% savings. By achieving an 80% reduction, the Ibstock and GTech teams are supporting the industry in effectively reducing the carbon output of their constructions, whilst still meeting demanding project specifications. By re-engineering existing products, cost efficiencies and manufacturing capabilities have been maximised to deliver a product that is immediately, widely accessible.

More information on Ibstock solutions can be found at www.ibstock.co.uk/anderton or by calling on 0333 234 3434.

Navigating green, on-time, cost efficient journeys.

KeTech



Converting from Paper to Digital Posters

LBFoster

One commonly used communication asset by TOCs is Paper Posters, these posters display various station information, including timetables, engineering works, special offers, events, and legal notices. However, paper posters quickly become outdated, are prone to damage, and contribute to visual clutter—additionally, the high volume of printing results in significant amounts of non-recyclable waste ending up in landfills.

On average, an A0-sized poster weighs approximately 160 grams, and a non-recyclable protective clear plastic sheet adds around 180 grams. Considering a TOC with 180 stations, each with approximately 20 posters changed three times a year and protective sheets replaced annually, the total annual landfill waste amounts to around 2.37 tonnes.

Implementing digital poster displays at stations offers several advantages - they provide up-to-date travel information, advertising, and promotional messaging. Managed through a centralised Content Management System, digital posters enable easy distribution of approved artwork to all stations, ensuring current and relevant messages. Digital posters have various benefits over paper posters, including more significant impact, cost savings, flexibility, engagement, eco-friendliness, and the ability to display journey information during disruptions. Digital designs can be quickly approved, eliminating the need for physical proofs and reducing reliance on chlorine gas-based printing processes. Distribution becomes faster, as approved artwork can be electronically delivered to stations via the cloud, reducing transportation-related costs and emissions.

Digital posters provide advantages for TOCs, such as meeting environmental targets, enhancing passenger recruitment and retention, increasing revenue, and reducing congestion. They also benefit communities by reducing vehicles on the road, supporting sustainable transport, improving health and well-being, and reducing congestion, noise & visual pollution, and climate emissions.

Case studies demonstrate the positive impact of digital screens. TransPennine Express replaced faxed speed restriction notices with digital screens, saving approximately 0.1 tons of paper waste annually. Costa Coffee's UK transition from paper posters to digital screens resulted in a reduction of 14 tonnes per month of landfill and a 14% sales uplift in stores with digital screens compared to stores still using paper posters.

Converting from paper to digital documents offers additional benefits, including enhanced workflows, increased productivity, improved customer satisfaction, and data compliance—digital imaging safeguards against permanent data loss and non-compliance fines. Digital screens enable real-time, accurate information updates, ensuring compliance and avoiding fines for outdated, unreadable or incorrect information.

Going digital future-proofs operations by reducing printing, distribution, and installation costs. Inflation and rising expenses make printed materials increasingly expensive, while digital screens offer a more cost-effective and sustainable solution for the long term.

- **Impact:**
  Digital posters have a greater impact with viewers.

- **Cost savings:**
  Digital posters are more cost-effective in the long run when compared to physical posters. This is because they do not require the continuous printing or purchasing of paper. Frequent content changes amplify these costs further.

- **Flexibility:**
  Digital posters can be quickly updated and changed remotely, without having to reprint anything or make any physical changes.

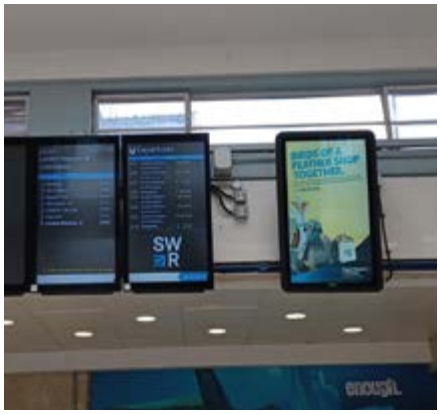
- **Engagement:**
  Screen-based posters are more engaging than paper posters. Animated content and bright screens can be used to draw your audience in to engage with your messages. Moving images automatically attract the eye, it's a built-in survival instinct when something moves within our peripheral vision, we automatically look to see what it is.

- **Eco-friendliness:**
  As they do not require any physical printing, digital posters are more eco-friendly than paper posters.

- **Journey Information:**
  Digital posters can revert to become CIS Boards during times of disruption and/or if the main CIS screens stop working. Travel information can be interleaved between the Posters, encouraging passengers to review the screens.

These are just a few of the benefits of using screen-based posters. With the right approach, electronic posters can effectively communicate with audiences in a visually engaging, cost-effective, and environmentally friendly manner.

For more information or to discuss your requirements please contact: Anthony Thompson, Business Development Manager, Mobile: (+44) 07741 142940 Email: anthonythompson@lbfoster.com



World's lowest carbon intensity leather product

Muirhead
Fine Scottish Leather

Muirhead is a trusted supplier of high performance leather to some of the world's most respected passenger transport and aviation brands. Based in Scotland, the company has developed a cutting-edge circular manufacturing process, paving the way for the world's lowest carbon intensity leather product.

The pioneering process involves sourcing all rawhides locally, reclaiming energy from process waste, and turning by-products into much-needed raw materials – such as collagen – for other industries. At the core of this circular approach is a fully traceable, transparent supply chain, which allows Muirhead to optimise its carbon footprint at every stage of the leather's journey – from farm to cut material and seat covers.

The key to Muirhead's circular supply chain is ensuring the energy embedded in the process waste is reclaimed and repurposed, never lost. Muirhead's patented Thermal Energy Plant converts waste into heat used to power its tanneries. With this process, the company is able to reclaim enough energy to heat 5,000 households from its waste alone.

Together with its parent company, Scottish Leather Group, Muirhead was the first leather manufacturer to publish an independently verified Life Cycle Analysis (LCA) and continue to have the lowest LCA published for genuine leather in the world, at 8kg CO2e/m2. The assessment estimates the environmental impacts attributable to the entire life cycle of a product – including the influence of upstream farming, the manufacturing process, distribution, transportation, and end-of-life disposal.

The need for decarbonisation has not only transformed Muirhead's manufacturing process, but has also left a profound impact on its portfolio of high performance, sustainable leather products. Its reduced weight LightCore™ innovation, for instance, was designed to help extend the range of electric vehicles and reduce emissions of conventionally powered stock. To do this, Muirhead had to re-invent its leather from the inside out, using a pioneering tanning process to create a true full substance leather that is up to 33% lighter than standard leather – without sacrificing performance, safety, or comfort.

By choosing genuine leather over synthetic alternatives, Muirhead customers are able to harness the natural durability and long lifespan of the material. In the longer term, this means less frequent replacements and, consequently, lower overall carbon emissions associated with manufacturing and transportation. When it comes to disposal, genuine leather biodegrades much faster than plastic-based alternatives. However, the company also operates a pioneering Take-Back scheme whereby end-of-life leather products are converted into heat – making Muirhead leather a truly zero-waste product.

Thanks to their commitment to circularity and sustainable innovation, Muirhead and Scottish Leather Group have been able to radically reduce their footprint without ever resorting to carbon offsetting initiatives. As revealed in its 2022 Environmental Social and Governance (ESG) report, the group is now 90% on its way to achieving net-zero by 2025 – twenty years ahead of Scotland's net-zero ambitions.

The leather maker's strides towards decarbonisation have been driven by a series of multi-million-pound investments implemented over the last twenty years, ensuring Muirhead continues to set the benchmark as the lowest carbon leather available to the passenger transport sector.

Further information:

About Muirhead
How Muirhead lowers carbon through circular manufacturing
Muirhead LightCore™ and other innovations
Scottish Leather Group ESG report 2022

Supporting our railway's transition to Net Zero

porterbrook

HydroFLEX

As the rail network's electrification strategy continues to evolve, hydrogen remains a key mechanism in the industry's ambition to reach net zero by 2050. Porterbrook's HydroFLEX has reached new milestones under operation in hydrogen power in recent months.

In June, Rail Live guests were able to experience HydroFLEX first passenger service operation. Running between Honeybourne and Porterbrook's Long Marston Rail Innovation Centre, the train helped around 1000 attendees get to and from the event.

In September, the train reached 90mph in hydrogen mode, conquered Lickey Hill, the UK's steepest mainline incline and became the first train in the UK to safely travel through a tunnel whilst powered by hydrogen.

Supporting modal shift in the freight market

Playing our part in growing rail's modal share is key to Porterbrook's sustainability strategy, as well as the UK's ambition to transition to net zero.

In partnership with GB Railfreight (GBRf) and Greenbrier, Porterbrook has recently completed the successful delivery of 100 FEA-G intermodal wagons and 50 JNA-X box wagons to the UK, increasing rail freight capacity and encouraging a modal shift from road to rail.

The innovative new intermodal high-density twin wagons can carry six twenty-foot equivalent units (TEUs) on each service, significantly increasing the volume of cargo that can be transported on each journey. The JNA-X box wagons also represent a design evolution, featuring additional strengthening which allows them to carry 101.6 tonnes on the box.

Each tonne of freight transported by rail produces 76% less carbon than road haulage, which means the new wagons will help to deliver a more sustainable railway and support the UK's interim decarbonisation targets.

A sustainable future for very light rail. Build local, deliver local.

Transport Design International's (TDI) Net Zero commitment includes utilising Very Light Rail technology to reach the Rail industry's Decarbonisation goal both in the UK and Internationally. TDI is already recognised as the leading company behind Very Light Rail (VLR) technology. TDI's Design and Engineering teams are working to meet net zero targets for the next phase of the rural solution, Revolution VLR.

"Very Light Rail is our solution for sustainable transport in the rail sector. It is central to our commitment to help drive decarbonisation in the rail industry and throughout our supply chain. Unlike conventional railway systems that rely on heavy vehicles and carbon-intensive components, VLR combines lightweight design with minimal environmental impact." – Lyle Swan, Sustainability Lead, Transport Design International

TDI combines cutting-edge Very Light Rail technology, strategically located Local Manufacturing Centres (LMCs) and a commitment to eco-design principles. This places the circular economy at the forefront.

TDI not only reduces vehicle weight and energy consumption, as demonstrated with their products: Revolution VLR, Coventry VLR and Lync VLR, but also enables lighter infrastructure. This lowers the carbon footprint across the entire rail supply chain. A lighter weight rail vehicle takes less power to propel and causes less wear on rail infrastructure, two important benefits for ensuring efficient running on rail services. Revolution VLR has a 40% saving on a single-car self-powered heavy rail vehicle of a comparable capacity. This is achieved by careful selection of lightweight, high-performance components.

Moreover, the establishment of Local Manufacturing Centres (LMCs) minimises transportation-related emissions and bolsters regional economies. TDI's dedication to eco-design ensures the creation of environmentally responsible products and systems, designed for maximum longevity and recyclability, further propelling our pursuit of a net-zero future.

Additionally, a full commitment to a battery-electric vehicle fleet marks a significant milestone in achieving cleaner and greener transportation.

TDI takes its commitment to sustainability seriously, successfully gaining ISO 14001 accreditation. Engaged with many in the Rail Industry, they strive to make their VLR products even more environmentally friendly and accessible for all. From the initial stages of the design process, they assess the entire life cycle impact of their vehicles, implementing systems that safeguard the environment and offer economic sustainability and enrichment for local communities.

Transport Design International are market leaders in the design and manufacture of lightweight, mass transit solutions for the transport industry. With 30 years' experience in the rail industry, their Very Light Rail product platforms Revolution VLR, Lync VLR and Orbit run on lower-cost infrastructure and offer more affordable transport solutions. Their product portfolio offers platform and kerb height vehicle solutions and single or multi-car options for both urban and rural routes. All projects are aimed at achieving the company's sustainable goals of zero-carbon functionality for a greener future.

Speak to our Sustainability Lead to build a greener future for all.
Email: info@tdi.uk.com
transportdesigninternational.com

Tidyco's journey to a sustainable future

Tidyco

PV Panels

In 2012, 3% of turnover invested into PV panels Electricity costs averaged £21,000 per year.

Currently generate 75% of our electricity.

LED Lighting

Replaced 50 fluorescent lamps with proximity based LED units.

Approximately 5,600kWh of energy saved per year.

EV & Charging

Five years ago company cars were 100% diesel – now it's 83% hybrid or all electric.

Five charging stations – with more to come in 2024!

Heat Pumps

Moved away from gas in 2020.

Current system is 400% efficient!!!

For every 1kW of energy put in, 4kW of heat out!

A Tidy Future

90% of packaging comes from reused (supplier) packaging. By reusing packaging, Tidyco are able make cost savings but more importantly help save the planet and the environment

ISO 14001

Tidyco is ISO 14001 certified!

For more information please visit www.tidyco.co.uk/esg

Circular Economy - Thinking Outside the box

As a responsible and forward-thinking company, TVS SCS has monitored its carbon emissions for many years and began to see an increase in its footprint relating to material use – particularly packaging.

As our share of new markets grew, the packaging we used for some clients grew beyond original predictions. This is down, in part, to us moving from deliveries to a central hub to deliveries direct to the end-user – in this case, a large number of mobile engineers. We realised the problem of downstream packaging use and endeavoured to do something about it.

We calculated that thirty-one thousand boxes were being used in our supply chain network annually. As a product supplier and not a manufacturer, the scope for us to contribute to a circular economy was not as broad as it might be for other companies. We quite literally had to Think Out of the Box.

The areas we can influence were quickly whittled down to the packaging. We already partner with a zero-to-landfill waste management company; we did not directly control our fleet of vehicles when developing this CE initiative. The scope of products we supply to our clients is often of such a type that they cannot feasibly be re-sourced. Additionally, as we know, the properties of cardboard mean they are susceptible to damage or collapse from time to time.

TVS SCS had already changed its packaging supplier in 2019 to one that only uses 100% recycled and 100% recyclable cardboard products, which is a significant step forwards but still has a considerable carbon footprint through the recycling process.

And so, working closely with our client, the decision to transition to reusable tote boxes was developed:

To implement this project, TVS SCS initially made heavy investments in tote boxes, but we required few changes to our distribution centres due to their similar size to cardboard. Feedback from our client also found that very little change was needed with the engineers' receiving deliveries from us.

The rollout of this project has seen massive reductions in the CO2e from our packaging and the amount of packaging we purchase overall, as shown.

TVS SCS is always looking for ways to reduce our carbon output and we welcome input from our clients on ways we can achieve this together.

Tools for a Sustainable Business

Knowing where to start on decarbonisation and sustainability is the difficult part, but once a roadmap is in place then there are a series of steps that you take on the road. Unipart Rail is well advanced on its journey - here are some examples of how it's doing it - a lead that you can follow.

Carbon Neutrality

The business has signed up to the race to zero pledge to become a net zero company by 2040. By identifying our Scopes 1,2 and 3 carbon inputs, we can accurately target activities that adversely affect our goals, and action them accordingly.

An example is that we have discontinued the use of gas at our Southport site, replacing it with carbon-neutral electricity, eliminating a whopping 65 tonnes of CO2 per annum.

Two of the tools we use are ECO Insight and LCA.

Eco Insight

Eco Insight, developed by Unipart company Instrumentel, uses non-invasive sensors across gas, electricity and water to measure consumption and to pinpoint unusual use profiles for targeted energy reduction activities. We installed this at a customer warehouse, achieving full system payback in 3 months. We are linking this to our life cycle assessments for all of our manufactured products in order to measure category 10/11 and 12 of our scope three emissions which account of 95% of them overall.

LCA

We have instigated a cradle-to-grave Life Cycle Assessment of all the technologies manufactured at our sites to expose where there are big carbon impacts and to work to find ways of reducing them. This process is allowing us to pin point our efforts, so for example, we now know that the physical manufacture of products have very little carbon emissions and that the biggest impact os from the acquisition of materials. This is allowing us to design out carbon by replacing carbon heavy components with locally sourced, less impactful products. As we make our sites carbon neutral, we can work harder on our Scope 3 emissions through our supplier network.

For more information on how to achieve these in your business, contact

liz.hancock@unipartrail.com

Repowering rail for the environment and the economy

With mounting pressure on the transport industry to move towards a greener future, which has been further heightened with the launch of the Transport Decarbonisation Plan in July 2021, ZF is actively investing in its repowering technology in support of rail operators.

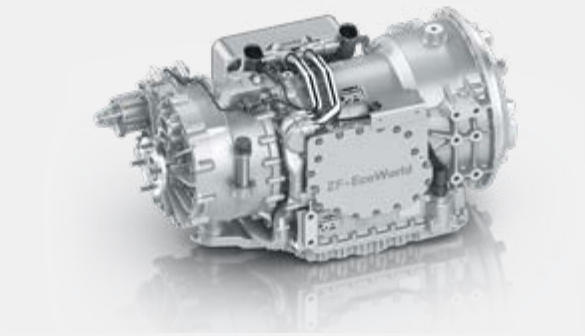
ZF Services UK has recently worked with Rolls Royce Power Systems MTU and Irish Rail (Iarnród Éireann) to repower Class 22000 Hyundai Rotem Diesel Multiple Units (DMUs), with new six-speed powershift EcoWorld transmissions from ZF to enable more efficient operation, improved acceleration and reduced noise.

Calculations project that this would result in annual savings across the entire Iarnród Éireann InterCity Fleet (ICR) fleet of approximately €2 million, as well as fuel savings of 3,510,000 litres and 3,931,200 per kWh, not to mention CO2 emissions savings of 9,419 tonnes.

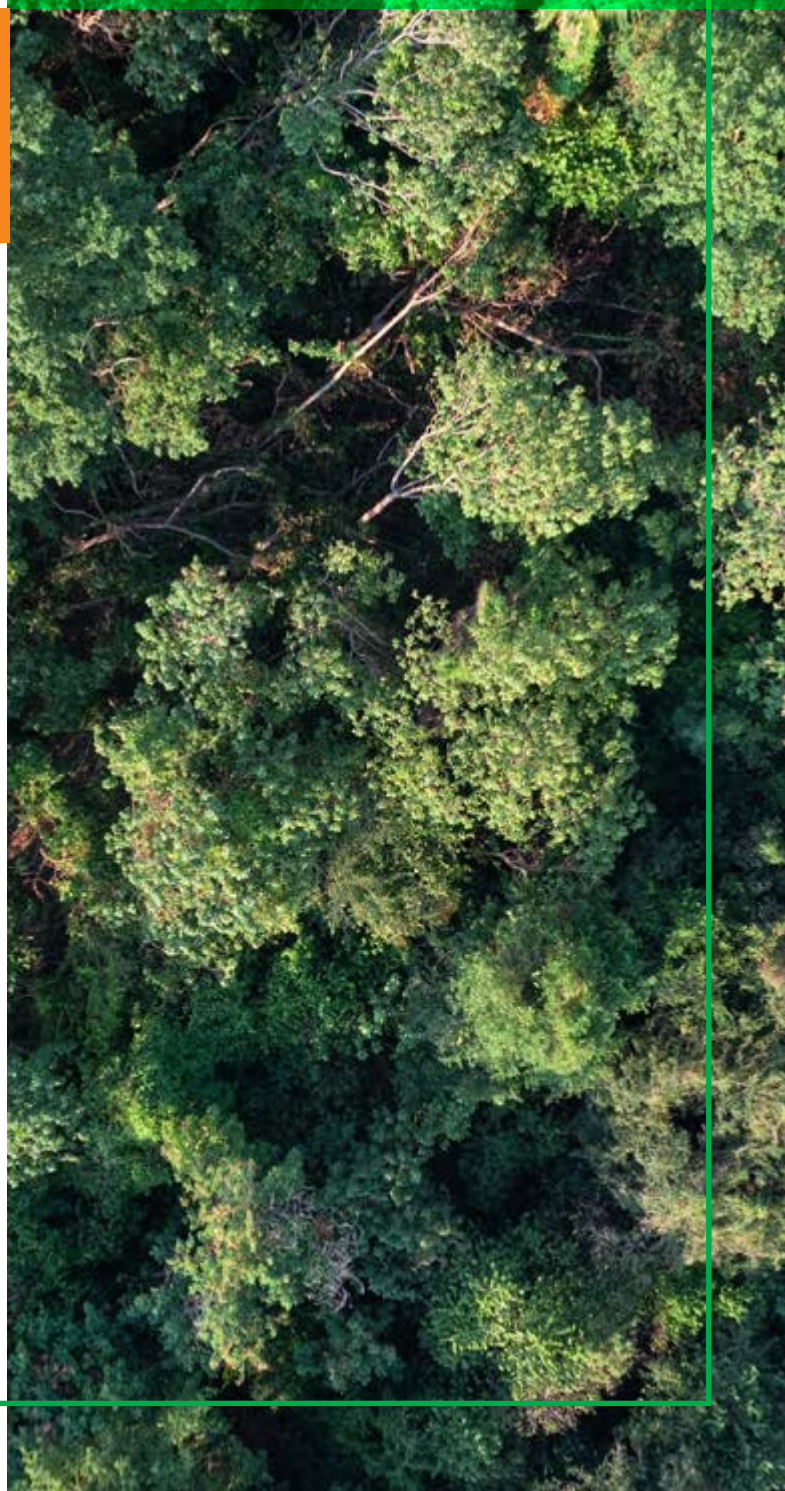
ZF has also partnered with Rolls Royce Power Systems to deliver ZF Ecoworld as part of the MTU Hybrid PowerPack for the Porterbrook HybridFLEX project. This conversion of the Chiltern Class 168 DMU from diesel-only to hybrid operation is the first of its kind in the UK.

London-Birmingham simulations show that a HybridFLEX unit adopting a fuel conservation driving strategy may consume up to 24 percent less fuel, use 41percent less friction braking energy, emit up to 122 tonnes/year less CO2 and 74 percent less NOx.

In addition to offering operators the opportunity to save fuel, reduce noise and emissions in and around stations, HybridFLEX units also offer the opportunity to reduce journey times by combining diesel and electric power for increased acceleration.



Rail Supply chain **decarbonisation**



Rail Forum Route Zero 2

Rail Forum

info@railforum.uk