



Rail Supply Chain Decarbonisation

March 2023

Forward

Rail Forum's Rail Supply Chain Decarbonisation brochure showcases solutions that help decarbonise the railway to meet net zero targets.

As the COP26 Climate Change Summit in Glasgow came to a close, Rail Forum launched its Route-2-Zero Programme. Whilst COP set the scene we knew that it was just the beginning of our collective commitment on climate change. Net zero isn't just a short-term campaign; we need to embark on effective long-term change.

The UK government made it clear that public procurement will be used as a key lever to drive carbon reduction and clients across our industry are incorporating net zero related criteria into their contracting strategies.

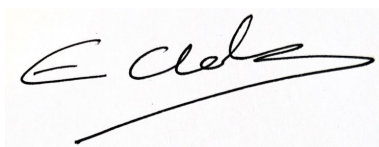
As always, our members are at the heart of what we do and we are committed to ensuring that we support them on this important journey.

Our Route-2-Zero programme incorporated a series of online workshops designed to help ensure that the rail supply chain is able to grasp the net zero challenge and get to grips with the challenges of reducing their carbon footprint — and not just carbon but other green house gases too. Of course the Rail Forum is not immune to the imperative of achieving net zero and we are on the same journey alongside our members.

The events featured a number of speakers from key clients explaining what they expect from the supply chain and also served as an opportunity for members to feature the great steps they are taking in response to this challenge.

We were particularly keen to provide multiple forums for SMEs to promote what they are doing to reduce their environmental impact and the launch of this brochure complements our activities and highlights some of our members' achievements to date.

With thanks to all our first edition contributors. We invite further contributions from our members for the second edition — we hope the net zero solutions showcased inspire further organisations both within our industry and cross-sector.

A handwritten signature in black ink, appearing to read 'E Clark'.

Elaine Clark

Chief Executive Officer
Rail Forum

Rail Forum members showcased:





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 - 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

Recofloor have collected 6,000 tons of waste vinyl flooring resulting in 7,038 tons of CO₂ 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



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



Our safety flooring is wrapped using **100% recyclable packaging**





Anderton

80% Carbon Reduction on Platform Copers for Network Rail

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.

Anderton implemented a three-stage plan to achieve these goals which was developed reflecting the core values of the Istock 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 1: 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 2: Use new technologies outside current guidelines CEM IIIC cements or Geopolymer.

Stage 3: Review of design and development of materials.

Together GTech and Anderton 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 1 - 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 2 - 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 Anderton Concrete 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 Anderton Concrete 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 Anderton solutions can be found at [Rail Products | Anderton Concrete](#) or by calling on 0333 234 3434.



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.

We are currently in the data acquisition phase and are scheduling a trip to Long Marston, supported by Porterbrook, looking forward to gathering some data!



Department for
Business, Energy
& Industrial Strategy

On 26 January 2022 I was delighted to speak at the launch of the Rail Forum's Route-2-Zero Programme. This swiftly followed on from the historic COP26 Climate Change Summit in Glasgow and clearly demonstrated that the rail supply chain in the UK wasn't wasting any time in picking up the baton to help drive change.

So much has happened since then, including the invasion of Ukraine, that might have risked giving pause to businesses' ambitions – but that's certainly not the case with these Rail Forum member showcases!

On 13 January 2023, 'Mission Zero: Independent Review of Net Zero' led by the former BEIS minister Chris Skidmore, was published. It was commissioned in part to ask how the UK might deliver its own net zero targets in a manner that was both more affordable, more efficient, and in a pro-business and pro-enterprise way.

It highlights how the UK's leadership on tackling climate has led to positive change both here and internationally – with more than 90% of the world's GDP now committed to net zero.

One year on from the Route-2-Zero launch, three things strike me about the solutions Rail Forum members are implementing to help decarbonisation. They are the commitment, energy and imagination of Rail Forum members to embed a 'what works' approach into their daily business activities that demonstrates the art of the possible, providing valuable evidence to government officials like me; particularly in light of BEIS' £28m investment in the new Global Centre of Rail Excellence that will be the UK's first net zero railway.

Net zero, decarbonisation and clean energy growth will only happen with the delivery of economic benefits that can demonstrate to everyone the true value of the energy transition. And the Rail Forum's Rail Supply Chain Decarbonisation brochure is helping to do just that!

James Brewer

**Head, Rail Supply Chains
Department for Business, Energy & Industrial Strategy (BEIS)**

Sustainability is crucial in every industry and branding 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](#).

Focusing on recyclability has allowed us to become a more sustainable business and provide more sustainable products by creating a circular lifecycle for the materials we use.

Our [RE:CYCLE](#) service, first used in collaboration with [DPD](#) and then [Menzies](#), is the perfect example of this. All offcuts and decommissioned vinyl from wraps are collected and baled by us before being recycled into further recyclable products such as traffic cones. Backing paper is no exception - we collect and recycle that too.

Following its success, **RE:CYCLE** forms a key part of our [Greenbrand](#) portfolio and has now been rolled out to our rail sector projects.



The recycle theme reinforces our refurbish not replace ethos. Wherever possible we seek to use refurbishing solutions such as DI-NOC to minimise waste and production.

Aura regularly demonstrates this through the refurbishment of rolling stock such as our recent completion of the Transport for Wales Class 150 trains. We also applied temperature control window films to reduce energy usage and costs year-round.

We will always champion state-of-the-art solutions in the rail industry that reduce environmental impact – evident through the projects we undertake such as the [environmental wrap](#) for Strathclyde Partnership for Transport.

Our ongoing partnership with [Avanti](#) has seen us collaborate on multiple nationwide projects using high quality and versatile 3M Envision non-PVC film:

- Unified fleet of 574 vehicles with the iconic Avanti branding
- Wrapped the [Climate Train](#) which transported attendees to COP26
- Applied Pride livery in support of LGBTQ+ highlighting the importance of diversity



Most recently, Aura was awarded the supply and application of all 68 sets of livery of the [Cairo monorail](#) by Alstom, for what will be the largest driverless monorail in the world! 3M Envision high-performance non-PVC film is being used to keep the branding sustainable but durable to withstand the high temperatures in Egypt.

This incredible project will provide a sustainable method of transport and improve mobility for thousands of people whilst reducing congestion and pollution. Having successfully completed its first trial run, the monorail is making its debut at COP27.



Working with Beacon Rail on the route to decarbonisation

With the Government intention to create a net zero rail network by 2050, Clayton Equipment is well positioned to work with the industry to meet this target.

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.

Our 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.

Very much embedded in the twenty-first century, the highly developed Class 18 locomotive, 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 will offer our customers a greener and sustainable option for rail freight operations in the UK against the backdrop of targets to reduce emissions.



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

The 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

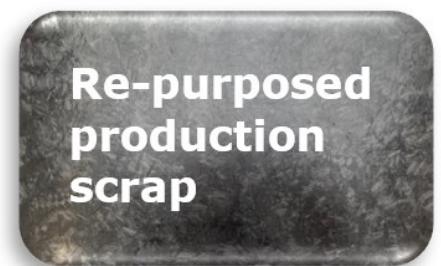
Composite Braiding Ltd (CBL) offers light weight, affordable advanced composite components that are key enablers to decarbonisation and sustainability.

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-known 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.

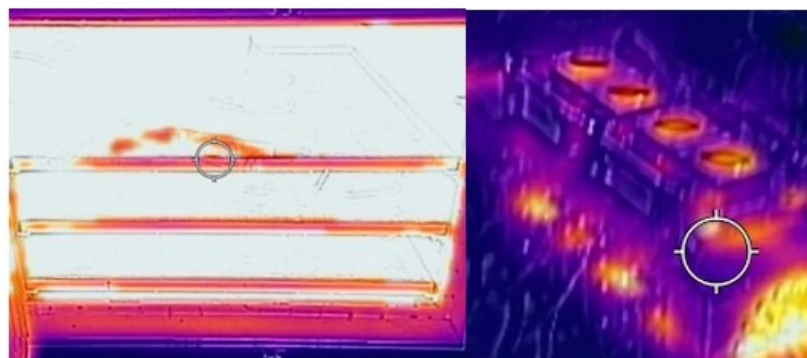


Energy Waste Reduction

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.



Oven at 260C

Our process at 260C

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.



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.

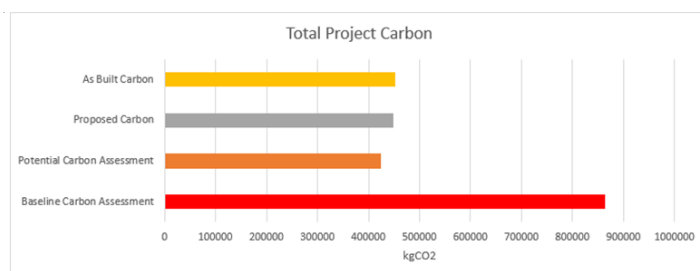


Project No:	F-3722 - Carbon Assessment Tool Phase 2
Project Name:	Example Project - Llynclys yard

Asset Type	Quantity	Design phase			Project Close	Units
		Baseline Carbon Assessment	Potential Carbon Assessment	Proposed Carbon	As Built Carbon	
Ground Trough	10000	214078	79152	79152	79152	kgCO ₂
Trough Lids	12000	158773	103258	114361	114361	kgCO ₂
Elevated Route	1000	114877	109886	109886	109886	kgCO ₂
Elevated Route Foundation	1001	25404	19157	19157	19157	kgCO ₂
UTX Chamber	12	17994	15106	15106	15106	kgCO ₂
LOC Foundations	4	6365	902	902	902	kgCO ₂
Staging Foundations	16	6482	5857	5857	6482	kgCO ₂
REB Foundation	2	12058	3612	7835	12058	kgCO ₂
PSP/ASP Foundation	1	12842	10917	12842	12842	kgCO ₂
DNO/Transformer Foundation	3	1773	1347	1347	1347	kgCO ₂
Signal Foundation	6	8127	2323	8127	8127	kgCO ₂
Ground Signal Foundation	2	596	205	205	205	kgCO ₂
Ancillary Posts and Foundations	24	4548	3193	3193	3193	kgCO ₂
King Post Wall under 1m	2	960	224	224	224	kgCO ₂
King Post Wall Foundations	4	1481	802	802	802	kgCO ₂
PHC Foundations	4	827	251	251	251	kgCO ₂
Compound Fencing	100	159727	30031	30031	30031	kgCO ₂
UTX Duct	36	117309	38713	38713	38713	kgCO ₂
Unforeseen Bespoke Parts - Signage	8	0	0	40	40	kgCO ₂
		Baseline Carbon Assessment	Potential Carbon Assessment	Proposed Carbon	As Built Carbon	Units
TOTAL CARBON, kgCO ₂		864221	424938	448032	452890	kgCO ₂
SAVINGS %		0%	51%	48%	48%	%

Assessment Type Description

- Baseline Carbon** Carbon produced from assuming Business as Usual (BAU) designs which use the most common options for design for specific assets.
- Potential Carbon** Least carbon option for each asset type.
- Proposed Carbon** Carbon produced from the chosen options for each asset type taking into account option costs.
- As Built Carbon** Post project assessment incorporating any site based changes to design options.



One Million Environmentally Better Workdays - ***A Tree for Every Placement***

The Ford & Stanley Group mission is to create one million better workdays through facilitating great recruitment, leadership and occupational mental fitness.

Ford & Stanley Enviro-Tech was launched in response to the increasing demand in our services to source and supply the technical talent required to help the UK meet its Net Zero commitments.

Careers in Sustainable Industries and Technology

We sustainably connect people and organisations with a passion for making a difference.

Green credentials are increasingly a key factor in employment choices, with most people aspiring to work for organisations that are environmentally responsible.

The reported skills shortages are a real issue for the UK with Net Zero targets wholly dependent on organisations having the right people available to develop and implement the technology.

People might ask what recruitment has got to do with the environment, but right there you have it – there's a straight line between having the right talent when needed and targets being met..

'A Tree for Every Placement'

We have agreed planting areas with landowners in estates covering over 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 provide hundreds of years of environmental benefit per tree.



Wellbeing & Conservation Meadow Sponsorship

The Ford & Stanley Conservation Meadow in Derbyshire has become a mecca for wildlife and the recently launched floating wetland represented a superb team project, with staff saving single use plastic bottles and repurposing other items to help build a floating eco island.

The floating eco island has become a thriving habitat for nesting waterfowl, pollinators and other insects, improved ecology with plants, and acts as a natural water filtration system.

Find out more about Ford & Stanley's conservation 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.

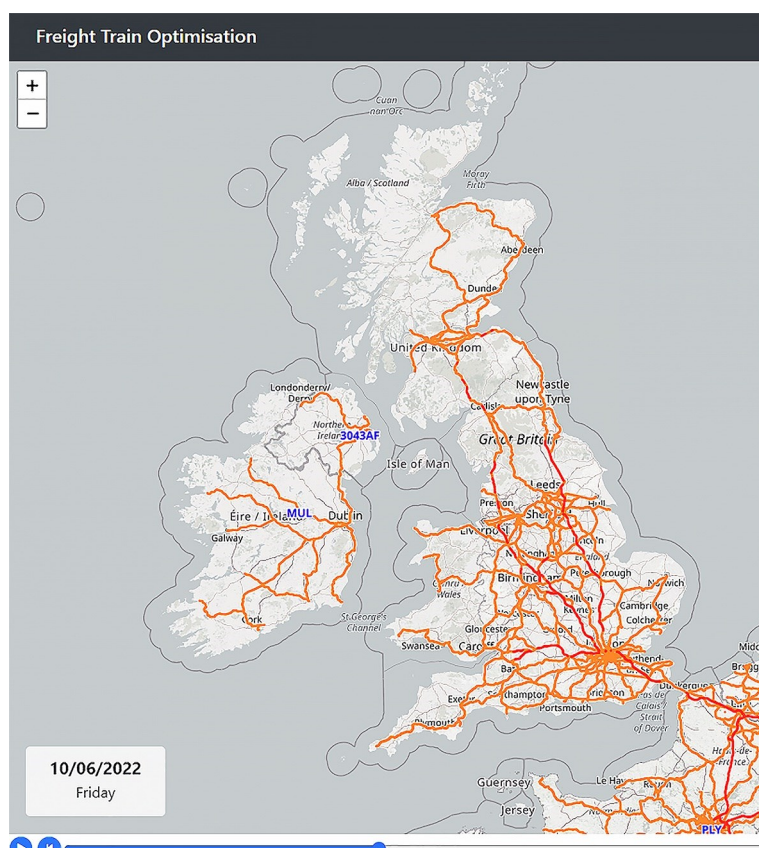
Why Frazer-Nash?

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/>





The smart, sustainable train toilet waste processing system that does it all

GBR-Rail is a Rail Forum Silver Member who specialises in rolling stock maintenance equipment – carriage wash machines, CET, fuelling, AdBlue, lubricating and monitoring systems and sand silo equipment. We deliver your whole project from initial design to the supply, installation, commissioning and continuing maintenance of your equipment.

It is our expertise in this field that has given us an in-depth understanding of the many issues around in-depot production and was the motivation behind the R&D project that resulted in Cleartrak – GBR-Rail's novel onboard train toilet waste treatment system. Cleartrak halves the operational costs of maintaining trains with toilets and does it in a sustainable and efficient way.

Cleartrak recycles liquid waste for use in handwashing and flushing and processes solid waste into a harmless biochar, which only requires emptying once every 6 weeks with a vacuum.

Cleartrak replaces the unpleasant and hazardous train toilet maintenance task, which takes trains out of service every 2 days, with a streamlined, onboard, in-service process that improves operational resilience and flexibility.

[Cleartrak Animation GBR Rail Ltd - YouTube](#)

Cleartrak has been certified for installation onto rolling stock and will continue extensive real-life testing, with first production version ready in late 2023. Cleartrak R&D has benefitted from a 2020 SBRI FOAK Award and 2022 SMART Grant from the DfT through Innovate UK.

GBR-Rail showcased their offering including Cleartrak at Innotrains in Berlin in 2022.

If you are interested in hearing more about Cleartrak please get in touch on info@cleartrak.solutions.



CLEARTRAK

Building Resilient Supply Chains

20 October 2022

Rail Forum **Route 2**
Zero

Featuring RF member



In partnership with



During October Rail Forum held a webinar on '**Building Resilient Supply Chains**' which featured Rail Forum member Alliance Procurement Solutions in partnership with Wylde Connections.

The session covered:

◇ **Global mega trends**

◇ **Positive business cases**

◇ **Developing a regenerative mindset**

◇ **Aiming to be net positive**

◇ **Sustainability strategy**

Sustainability is about much more than just net zero and climate change. We need to think about the Global Mega Trends... there are many! From rapid urbanisation to access to scarce resources and the shift in global economic power to technological breakthroughs. We also have conflicts, Covid, Brexit and more - so a true perfect storm. Rail suppliers are at the mercy of a host of issues... so what can we do?

Leaders must lead and make decisions that help shape a different and better future - we should embed circular thinking into our products and services and we should develop a regenerative mindset!

Importantly don't get left behind, aim to be 'net positive' and use your business case to demonstrate it's good business sense. From a rail perspective we need to challenge standards and specifications to help create new suppliers better able to respond than some current (overseas) ones; be mindful of overstocking and obsolescence and finally build your sustainability strategy.

**A new Global Centre
of Rail Excellence is
coming to Europe**

Supporting the UK's path to Net-Zero

What is GCRE – How can it support Net Zero

The Global Centre of Rail Excellence (GCRE) is a £250m 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

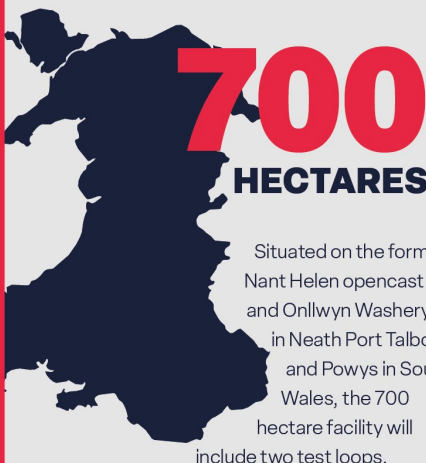
Rail is one of our critical national infrastructure assets and while we all rely heavily on the network, there has always been a missing piece of the jigsaw in rail testing and, particularly, infrastructure innovation. The UK and Europe lacks an integrated, single site facility to test new low carbon 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 6.9km high speed rolling stock track and the other a 4km track for heavy infrastructure testing. Opening in 2025 it 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 the Dulais Valley 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.

WHAT IS GCRE?

The Global Centre of Rail Excellence (GCRE) will provide state-of-the-art rolling stock testing, infrastructure testing and storage and maintenance for the UK and international rail industry. The open access facility will accelerate innovation, reduce costs, improve passenger experience and address challenges of de-carbonisation.



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test loops both electrified at 25kV AC. The outer - 6.9km high speed rolling stock test track with speed of 177km/h (potential for 201km/h under review), inner loop - 4km infrastructure loop designed for speed of 65km/h. We will run trains to load the infrastructure loop with 20MGT (60000) axle passes per year. Such loading provides realistic high TRL testing.

CO₂ NEUTRAL

This will be the UK's first net-zero railway and only purpose-built rail test facility, with features unique in Europe. Regenerating a former carbon-intensive industrial site and creating a national laboratory for decarbonising the UK's railway

DIGITAL TWIN

The facility will have a digital twin that is fully connected and instrumented to the tracks - enabling monitoring and control of the operating testing both remotely and on site. There will also be state of the art IP secure testing environments; equipment, systems and communications development facilities, an onsite 100-bed hotel, education, training, visitor and conference facilities.

£ 250M

This £250m project is intended to be fully operational in 2025. With funding from both the Welsh Government and the UK Government via BEIS, we are further aiming to secure private investment through an equity raise for which an investor proposal will be issued.

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 UK's path to Net Zero by 2050 through greater innovation and earlier testing of new products
- **Long-Term Infrastructure Planning:** Supporting the UK's 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

The project is currently split into three core phases:

PHASE 1: The creation of sidings for rolling stock from June 2023

PHASE 2: The building of two electrified test loops, one high speed test loop 6.9Km long and a 4km infrastructure test loop together with supporting infrastructure and buildings from 2024

PHASE 3: The addition of expanded stabling, maintenance, and commissioning facilities along with research facilities, hotel, and business park.

Fuel efficiency has been at the forefront of the rail industry for some time now, although it might not always be obvious... For years, diesel has held first place on the railroads expense list; coupled with decarbonisation at the top of the industry priority list, is now the time to implement innovative fuel efficiency technologies?

Eco-driving isn't a new phenomenon, the industry has been researching the topic since the 1960's yet it has been somewhat overlooked as a tool to increase fuel efficiency. This could be due to the fact there has been a lack of technology to properly facilitate it and therefore no opportunities for the rail industry to implement it and reap the full benefits.

Eco-driving presents a real opportunity for both passenger and freight rail to make significant energy and cost savings. Driver Advisory Systems have changed a lot in recent years, KeTech's Connected Driver Advisory System (C-DAS) is often mistaken for previous variations such as a Stand-alone Driver Advisory System (S-DAS). However, KeTech's C-DAS is fully signalling connected, meaning the C-DAS algorithm knows where the train is and any situational impacts at any given time. All of this is processed in real-time to provide highly accurate driver advice to make savings in both carbon and cost without the need for major changes to trackside infrastructure and current operations.

Behind the screen, KeTech's C-DAS is a complex system. The software is designed so the system and the driver can achieve common goals such as meeting the timetable, reducing energy usage and therefore costs. When ETCS is rolled out C-DAS ensures a consistent level of data/performance/updates regardless of the level of ETCS in that area. The rail industry is changing, and KeTech's system is modular in design to anticipate future needs that can change with the industry.



Case study / Implementation

KeTech's customer required a solution for their Class 350 fleet which would adhere to government legislation and industry targets regarding the reduction of CO2 whilst facilitating the franchise commitment to improve punctuality. To make C-DAS a viable solution it needed to be versatile in its integration with flexible display options and compatible with all train models. C-DAS would also need to be installed with minimal disruption to the fleet.

KeTech was able to utilise the clients' existing in cab infrastructure (display screen) and enhance it with agnostic software to provide real-time, accurate driver advice. This innovative approach was not only cost effective but time saving too, as it eliminated the need to remove and replace existing hardware devices. The system had a graded introduction by starting first in 'shadow mode' to capture journey and driver data for analysis and fine tuning, to later go live with connected driver advice.

As a result, the customer is capable of achieving a potential saving of up to 20% in fuel expenditure, meaning fewer CO2 emissions and significant financial savings. The information is provided directly to the driver in real-time, this allows the driver peace of mind that the information delivered is accurate and up to date. KeTech's C-DAS also has a reporting tool that can be used to provide improved driver feedback and incident investigation. This tool can also provide intelligence to prevent future delays or timetabling issues using data/trends collected throughout previous journeys.



KeTech's C-DAS received the Siemens Mobility Challenge and Innovate Award 2020.

Head to their website for more information: <https://ketech.com/products-services/cdas-2/>

Supporting the railway to Net-Zero



HydroFLEX

HydroFLEX is the UK's first hydrogen-ready passenger train. HydroFLEX can operate under electric and battery power, making it the world's first tri-mode hydrogen, electric and battery train.

Inside the hydro chamber the latest fuel cell technology combines green hydrogen with oxygen to power the vehicle. Porterbrook has invested around £12 million in HydroFLEX and 30 UK companies have contributed to its development. It was showcased at the COP26 climate summit last year in Glasgow and VIP visitors included HRH Prince Charles, now King Charles III.

HybridFLEX

HybridFLEX, Britain's first 100mph capable battery-diesel hybrid train, is the result of a four-year partnership between Chiltern, Porterbrook and Rolls-Royce. It features a retrofitted Rolls-Royce MTU power pack that significantly cuts carbon emissions, saves fuel and reduces noise and air pollution.

HybridFLEX can deliver 75% less nitrous oxide, 90% less particulate emissions, 75% less noise, 25% less fuel consumption and a reduction in annual CO2 emissions of 122 tonnes.

The first HybridFLEX train entered passenger service with Chiltern Railway in February this year. Porterbrook has invested £7 million in HybridFLEX with nearly 20 companies from across the UK contributing to its development



ROG Class 768



The electric-diesel hybrid ROG Class 768 has the traction capability to deliver express freight anywhere on the network. To create the Class 768, Porterbrook and ROG converted Class 319 electric units to also run on a diesel low-emission engine, giving more flexibility in routes by being able to switch between traction systems.

The former passenger vehicles were stripped of equipment like seating, luggage racks and toilets and converted to enable them to transport parcel-based freight across high-speed paths at up to 100mph, significantly reducing emissions by moving freight journeys from roads to rail.



TidycoTM

Tidyco's journey to a sustainable future

PV Panels

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

Currently generate 75% of our electricity – by the end of 2022 our target is 100%!



LED Lighting

Replaced 50 fluorescent lamps with **proximity based** LED units.

Approximately 5,600kWh of energy saved per year.



EV and EV Charging

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



Five charging stations.

Electric van trials starting this year.

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.



Where next?

- 50% increase PV panels overall
- Electric commercial vehicles
- Additional heat pumps
- Additional EV charging points
- ISO 14001 – achieved!

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.

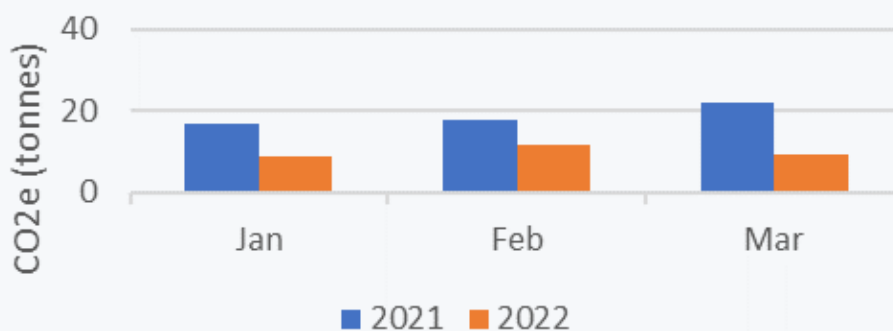
TVS SCS had already changed its packaging supplier in 2019 to one that only uses 100% recycled and 100% recyclable cardboard products, which is a significant step forwards but still has a considerable carbon footprint through the recycling process.

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.



CO2e from Packaging



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.



Rail Forum Route Zero²

If you would like to contribute to the 2nd edition of Rail Forum's Rail Supply Chain Decarbonisation brochure, please email: jemma@railforum.uk