



# Resilience First's decarbonisation and the role of technology

WEBINAR SERIES

RESILIENCE FIRST  
SURVIVE & THRIVE

In partnership with **intel.**



The webinar series 'Decarbonisation and the role of technology' looks at the role technology can play in helping to decarbonise a range of different sectors. This second webinar focussed on how technology can help reduce carbon emissions produced by rail travel.

Rail travel is already one of the most low-carbon methods of transport. It accounts for only 1.4% of total UK carbon emissions. However, more can be done to reduce emissions further and achieve net-zero carbon.



Caption: Electrification of lines has reduced carbon emissions by the railways

To start the webinar, Robert Hall, Executive Director of Resilience First, and Syamak Nazary, Global Sales Director Transportation at Intel Corporation, both spoke briefly to set the scene. Syamak pointed out that rail was not only low carbon but also convenient. If it were possible to travel from Manchester in England to Barcelona in Spain in four hours, everyone would do it in preference to flying due to the convenience of rail travel. Simplifying and enhancing the passengers’ experience as much as possible was another way to get people on to trains.

**Carbon-zero by 2050**

Jo Lewington, Chief Environment & Sustainability Officer at Network Rail, gave the keynote address about some of the ways Network Rail in the UK is tackling carbon emissions.

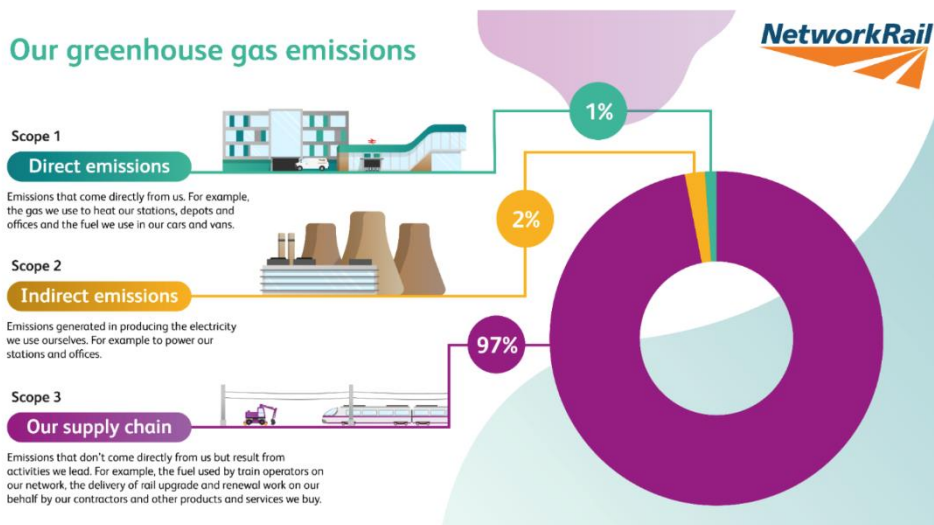
Network Rail launched its Environmental Sustainability Strategy in 2020 and aims to achieve carbon net-zero by 2050 in England and Wales (2045 in Scotland). The plan has four main pillars: a low-emission railway, improved biodiversity, a reliable service that’s resilient to climate change and the minimisation of waste. In developing this strategy, the company surveyed passengers and the public, who generally held positive views of the railway, but thought there was room for improvement. One in three respondents also placed climate change in their top three concerns for the future.

**Decarbonising the supply chain**

To achieve net-zero by 2050 Network Rail will need to work closely with its suppliers as 97% of emissions associated with the railways are generated by the supply chain. Many suppliers were already on the journey and there was much to be learned from them. Network Rail aimed to cut these supply-chain emissions by 28% by 2029. Creative engineering solutions will be vital in this area.

**Reducing direct and indirect emissions**

Network Rail can tackle the remaining 3% of emissions in the form of direct emissions from activities such as heating stations and offices, and indirect emissions generated by the electricity they use. It aimed to reduce these emissions by 46% by 2029. To do this will require a range of measures. Network Rail has a fleet of 9,000 vehicles, aside from trains, that are often powered by fossil fuels so need to be changed to low-emissions vehicles. Power generation from renewables, separate to the national grid, will help reduce indirect emissions.



Caption: Supply-chain emissions account for 97% of the railway’s carbon footprint

## **Resilience to climate change**

In addition to tackling climate change with its carbon-reduction targets, Network Rail launched a plan in 2017 to ensure its infrastructure was resilient to the effects of climate change. It has adopted an approach of 'not replacing like with like, but replacing like with better', meaning upgrading infrastructure to be resilient to more extreme weather when it is replaced.

Biodiversity was also part of the Environmental Sustainability Strategy and the aim was to achieve biodiversity neutrality by 2024, and biodiversity gain by 2035. Ground-breaking satellite technology is now being used to measure habitat to help.

## **A circular economy**

Network Rail spends £7bn a year on materials to maintain and build the railways. To reduce the carbon emissions in the supply chain it is reducing the quantity of new materials used and increase re-use. To this end, it is investing in researching new materials and ways of recycling existing materials that contribute to a 'circular economy'.

## **Enabling the organisation to reach the targets**

Integrating the Environmental Sustainability Strategy into business as usual activity is key to meeting the decarbonisation targets set by Network Rail. There needs to be a culture that enables employees to ~~act to~~ meet targets. The targets need to be at the centre of funding, systems and process decisions. Engagements with external organisations will be vital and encouraging the market to devise the technical solutions when needed.

## **Connecting assets with technology**

Paul Glynn, CEO of Davra ([paul.glynn@davra.com](mailto:paul.glynn@davra.com)) was next to speak. Davra is a company based in Dublin that provides a platform to connect together different assets allowing data to be brought together and analysed. Rail applications for the technology included tracking trains to provide data so it can be analysed in order to improve performance, and also provide information for passengers.

## **Combining data to assist passenger flow management**

To aid law enforcement with sports events meant large crowds will need to be managed. Davra's technology can be used to combine passenger counting data with train tracking to provide a complete picture of where and when crowds are likely to form.

## **Railways save 1.2bn tonnes of carbon per year**

Paul went on to underline the fact that rail was already very carbon efficient. If all services carried out by rail were moved to other forms of transport there would be an increase of annual carbon emissions globally of 1.2bn tonnes, which is the equivalent to Africa's total emissions.

## The Good News

### **Rail is by far the most carbon efficient method of transport**

“If all services performed by railways were instead carried by planes, cars and trucks, transport-related greenhouse gas (GHG) emissions would be 1.2bn tonnes of CO<sub>2</sub>-equivalent (GtCO<sub>2</sub>e) per year higher, the report says. This is equivalent to the CO<sub>2</sub> emissions of the whole of Africa”

### **Passenger Rail Emissions are falling dramatically in the UK**

“The level of CO<sub>2</sub>e emissions per passenger km in 2019-20 was 4.1% lower than the equivalent figure for 2018-19. This continues a general trend of falling emissions per passenger km since the start of the comparable time series in 2011-12.

Office of Rail and Road, Nov 2020

Caption: Without the railways global carbon emissions would be much higher

### **How to reduce rail carbon emissions further?**

Analysing the data – there are ways to decarbonise rail travel still further but unfortunately some are difficult or controversial to implement.

Reducing speed – air resistance increases ~~at a faster rate~~, the faster a train travels. Lower speeds mean less energy used, so reducing carbon emissions.

Fewer stops – every time a train has to get moving again more energy is used. This could be implemented if it was done carefully as it would mean faster journeys for some passengers.

Railway-line quality – better quality rails produce less friction which again means less energy used. This can be implemented but there are large cost implications.

Train type – in general electric trains have a smaller carbon footprint than diesel trains. The picture becomes more complicated in countries where electricity production uses mainly ~~with~~ fossil fuels like the US and Australia.

Train weight – trains are built with safety as the primary focus. This can lead to over-engineering which means more weight. Additional weight means more energy is required, so perhaps a different balance between safety and weight could be struck?

Remove First Class – a first-class traveller has roughly five or six times the carbon footprint of a regular passenger. This is tricky because some lines are only viable by charging more for first-class passengers.

### **Using passenger data**

Brad Lee, Sales Manager UK from Moovit ([brad.lee@moovit.com](mailto:brad.lee@moovit.com)) spoke about the Moovit app that provides travellers with real-time information about transport allowing them to plan their journeys efficiently.

The app has more than 950m users and integrates with over 7,500 transit agencies across the world. The data collected is anonymous and provides the largest dataset on passenger movement in the world. Urban mobility reports provided by the app can be valuable in analysing movement through transport systems.

The app generates 6bn data points mapping passenger movement every day. The level of detail this data provides can show small areas, like a shopping centre or a train station. On a larger scale, gaps can be identified in transportation systems where passengers are under-served. This can also help with future infrastructure planning, such as where to put banks of scooters.



The app can be used by transport companies to provide a better experience for passengers and entice them to use trains. Uber is a big user as it does not want to provide long journeys but only the first and last miles of long journeys that can better be carried out by public transport.

### **Questions – biggest challenges? Replacing ‘like with better’? The pandemic effects? Is the tech carbon neutral?**

The panel answered questions on the challenges for the rail industry if it is to get to carbon-zero. The biggest challenges for Network Rail were reducing the supply-side carbon emissions and obtaining funding for carbon reduction work. Jo also spoke about replacing Victorian infrastructure with infrastructure more resilient to climate change.

The impact of the pandemic also came up as a topic and the obvious funding challenges it would create. Jo acknowledged it was a difficult funding environment and will need creative solutions. However, a lot of projects are already in motion and there may be opportunities for freight and leisure travel. Paul and Alan stated that it was vital to get people back on to trains after the pandemic, given their carbon-efficiency, so improving passenger experience should be a priority.

The panel was asked about how IoT tech can help with decarbonisation. Paul said a lot of it is knowing where the issues were and using tech to react quickly. He also said that a lot of the rail companies were using tech to try and get people on to trains, as it was the most carbon-efficient mode of transport. He highlighted a project in San Diego that alerted travellers who were using the car of the fact that using a train would get them to their destination more quickly.

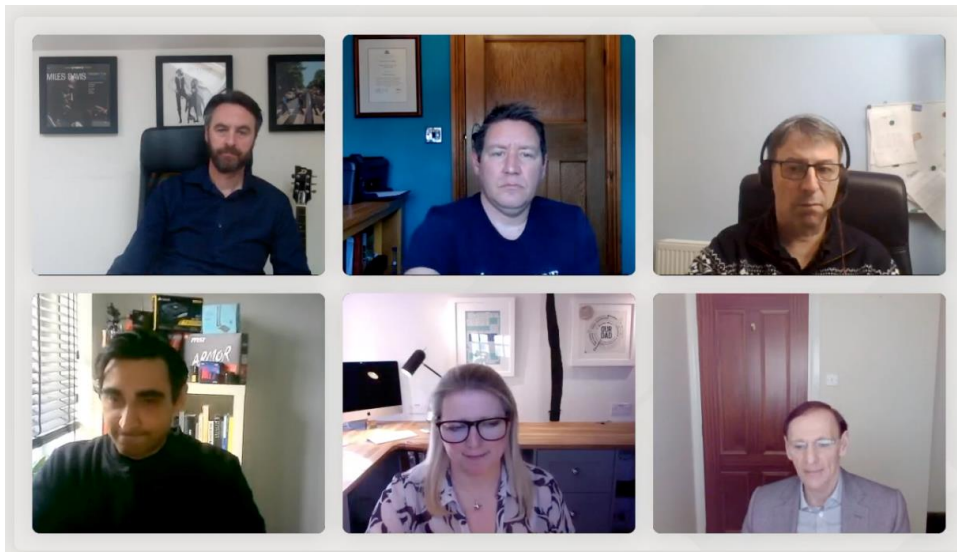
Jo highlighted tech that was helping Network Rail monitor air quality and biodiversity. Also, better signalling technology can help reduce the number of times trains have to stop.

If new technology wasn't carbon neutral it could add to the problem of decarbonisation, so the panel were asked about carbon efficiency. Paul stated that the data centres they use are under pressure to reduce their carbon footprint and have targets to get to net-zero.

Finally, the panel was asked about removing trees and vegetation near to tracks. Jo underlined the importance of keeping the railways safe but Network Rail was working with the Tree Council to plant



more trees on their estates.



Caption: Webinar participants (clockwise from left): Paul Glynn (Davra), Brad Lee (Moovit), Alan Bullock (Network Rail), Robert Hall (Resilience First), Jo Lewington (Network Rail) and Syamak Nazary (Intel)

The full on-demand recording of the video can be [viewed here](#).

**Further webinars from Resilience First, in partnership with Intel**

The Decarbonisation and the Role of Technology webinar series continues next Tuesday, 16 March 2021 when the focus will be on decarbonisation in manufacturing. After that, the final webinar will be on aviation and aerospace. For more details and how to sign-up to these free events please see our [Decarbonisation and the Role of Technology homepage](#)