Carbon Reduction Plan for First Rail

External Document

First Rail Consultancy

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Version History

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1 Introduction

First Rail, in line with its dedication to environmental sustainability, is committed to a goal of reaching Net Zero emissions by the year 2050. This aligns with the government's own targets, particularly the goal of having all diesel-only trains phased out by 2040. To achieve this, First Rail has developed a Carbon Reduction Plan (CRP).

This plan serves as our comprehensive strategy towards reducing our carbon footprint and has been produced in accordance with the guidelines outlined in the Technical Standard for Completion of Carbon Reduction Plans[1]. These guidelines ensure a stringent and standardised approach to managing and reducing carbon emissions in an effective and measurable manner.

FirstGroup, of which First Rail is a subsidiary, has set Science Based Targets validated by the Science Based Targets initiative (SBTi). FirstGroup will reduce scope 1 and 2 greenhouse gas emissions by 63% by 2035 as well as scope 3 GHG emissions from fuel and energy related activities by 20% by 2028, compared to a 2020 baseline year. FirstGroup further commits that 75% of its suppliers by emissions covering purchased goods and services and capital goods will have science-based targets by FY2028. First Rail itself aspires to set its own Science Based Targets at each of our train operating companies (TOCs) as part of our journey to Net Zero. South Western Railway (SWR) and Avanti West Coast Trains Ltd (AWC), two of our TOCs, have already had their near-term targets validated by the SBTi. SWR was the first rail company to set out a robust, transparent, and cost-effective roadmap to Net Zero.

2 Baseline Emissions Footprint

First Rail's baseline emissions are shown in Table 1 below. The baseline year has been chosen as FY 2020 since this reflects normal business practices before the Covid-19 pandemic and also coincides with the time when Avanti West Coast was incorporated into First Rail. We have readjusted the historic figures to account for the loss of the TransPennine Express contract.

Our figures include the emissions from all our TOCs. We have excluded figures from Island Line and those from subsidiaries such as Mistral and Evo Rail due to their negligible impact.

Scope 1 emissions from diesel traction are the majority of First Rail's overall total emissions within the scope of the technical standard. We are committed to reducing these emissions by removing all diesel-only trains from service by 2040 in line with government targets and by introducing bi-modes and battery trains. Avanti West Coast introduced the first of multiple new bi-modal trains in 2024.

The market-based scope 2 emissions for First Rail were close to zero. This is because in FY 2024 all our owned premises were powered by REGO-backed renewable energy and all electric traction energy procured through Network Rail was procured through zero-carbon nuclear sources.

[1] Microsoft Word - PPN 0621 Technical standard for the Completion of Carbon Reduction Plans.docx (publishing.service.gov.uk)

Our Scope 3 calculations do not include category nine emissions (downstream transportation and distribution) since they are not relevant to our operations.

Baseline Year: FY 2020 (1st April 2019 – 31st March 2020)	
Emissions	**Total (tCO_2e)**
Scope 1	316,384
Scope 2 (Market based)	1,534
Scope 2 (Location based)	298,429
Scope 3 - Cat 4: Upstream transportation and distribution - Cat 5: Waste generated in operations - Cat 6: Business travel - Cat 7: Employee commuting	12,099
Total Emissions (Market Based)	330,017
Total Emissions (Location Based)	626,912
Out of scope emissions[2]	11,629

Table 1: First Rail baseline year carbon footprint

3 Current Emissions Reporting

Current Year: FY 2024 (1st April 2023 – 31st March 2024)	
Emissions	**Total (tCO_2e)**
Scope 1	256,780
Scope 2 (Market based)	290
Scope 2 (Location based)	208,994
Scope 3 - Cat 4: Upstream transportation and distribution - Cat 5: Waste generated in operations - Cat 6: Business travel - Cat 7: Employee commuting	7,949
Total Emissions (Market Based)	265,019
Total Emissions (Location Based)	473,722
Out of scope emissions	14,562

Table 2: First Rail current year carbon footprint

[2] Out of scope emissions cover emissions produced by the combustion of biofuels.

4 Emissions Reduction Projects

First Rail's pledge to attaining Net Zero emissions by 2050 is reflected in its strategic approach. The CRP concentrates on achieving 'quick wins' by implementing short and medium-term interventions for assets under its control, hastening significant impact.

Working hand in hand with its suppliers, First Rail aims to stimulate substantial emission reductions throughout the broader supply chain. This collaborative endeavour is a testament to the fact that realising environmental goals demands collective effort.

Equally paramount is the commitment to economic prudence. The plans framed are cost-effective and flexible, ensuring they deliver excellent value for taxpayers' money. This balance between environmental responsibility and fiscal efficiency underscores First Rail's comprehensive approach towards achieving its ambitious Net Zero target. Our historic and projected emissions are reported in figure 1. These figures include emissions from scope 1 and 2 data from Avanti West Coast, Great Western Railway (GWR) and SWR, including also our open access operations of Hull Trains and Lumo. We are looking towards calculating full scope 3 emissions for each of our TOCs.

During FY 2024, First Rail has increased its Scope 1 and Scope 2 location-based emissions by 6% compared to FY 2023, mainly due to increased mileage and an increase in traction electricity consumption. Whilst our energy consumption and related GHG emissions may rise in the short term, we are focused on ensuring that any growth in operations is delivered in the most carbon-efficient way.

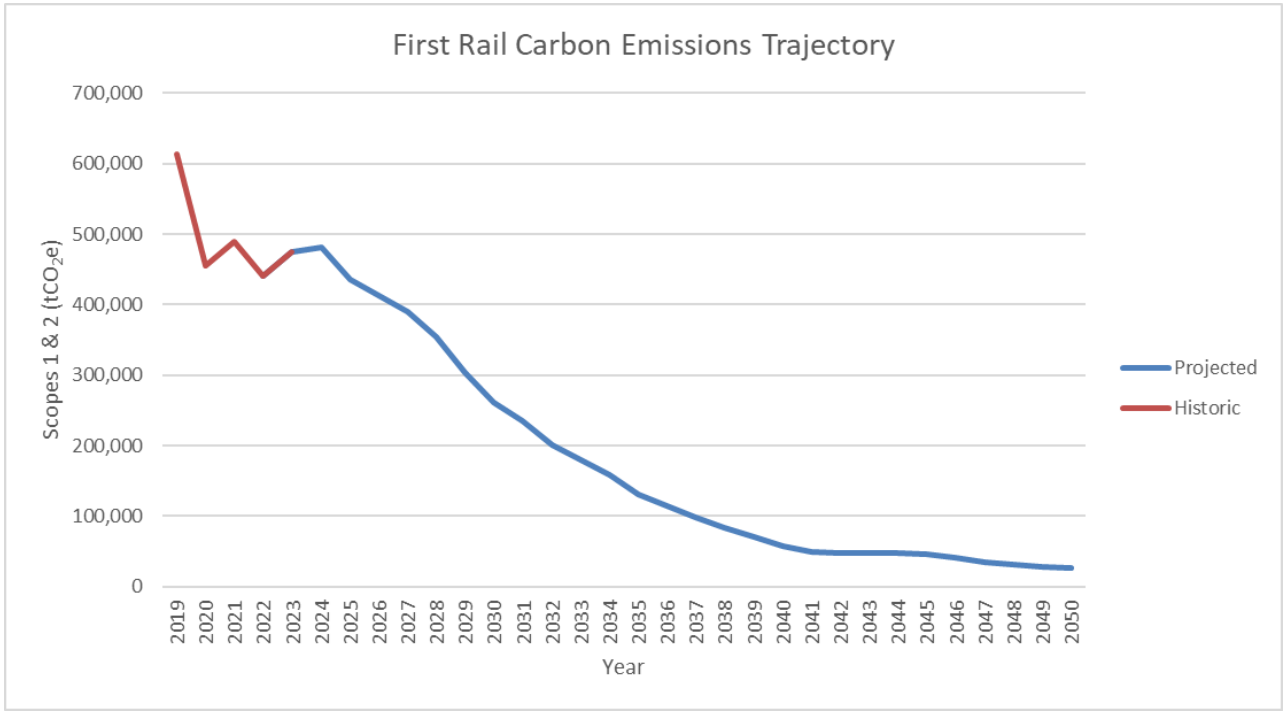

Figure 1: Carbon emissions figures for Avanti West Coast, GWR and SWR, projected to 2050.

The assumptions involved in the calculation of our emissions trajectory include the gradual decarbonisation of the UK electricity network and the implementation of our existing carbon reduction schemes. Our current projection shows we need further interventions to achieve Net Zero by 2050. Further emissions reductions may be achieved with either carbon offsetting and/or more initiatives to lessen our environmental impact.

4.1 Avanti West Coast Fleet Renewal

At Avanti West Coast, the ambition is to achieve Net Zero by 2031. This goal encompasses efforts to reduce emissions from various operational aspects, including traction, stations, and offices. The primary focus is on reducing emissions produced by traction, which involves a careful, phased approach to eliminating the use of diesel fuel in operations.

During 2024, Avanti West Coast saw the successful introduction of nine of its Class 805 Bi-Modal fleet and the first five Class 807 (EMU) which combined with the existing Class 390 (EMU) fleet have taken over routes which the previous Class 221 (DMU) fleet was operating.

The switch from an entirely diesel fleet to a mostly electric with some bi-modal supplement means that there are now zero miles of diesel operation on electrified infrastructure which has resulted in a big reduction in the emissions for AWC. The fleet upgrade is a critical step toward reaching Net Zero by 2031, and later in 2025 the true impact of the fleet introduction should be recognisable in the emissions data as further introductions are made.

4.2 GWR Battery Electric Trials and Fuel Updates

At GWR, we have invested in innovation through the purchase of assets from emissions-free and hybrid trains manufacturer Vivarail. We are trialling fast-charging battery electric technology on the Greenford to West Ealing line with the aim of replacing the use of diesel in running trains on the line. The Class 230 battery trains used in the trial have been made from repurposed ex-London Underground trains, with trial operations continuing into 2025 and an aspiration to provide these services to passengers in Spring 2025.

The GWR Engineering team is also aiming to improve fuel efficiency and economy through the utilisation of fuel additives, in a proposed project for 2025, we hope to see the additives in action on the GWR Hitachi Class 800 and 802 fleet as well as our other diesel consuming units in the future.

In 2024, SWR saw the first five of their new Arterio (Class 701) trains enter service serving key stations on our suburban network including Clapham Junction, Feltham, Hounslow, Kingston, Richmond, Shepperton, Staines, Twickenham, Vauxhall, Wimbledon and Windsor & Eton Riverside. We’re looking forward to introducing more Arterios, and sharing our wider rollout plan, in due course. The Arterio fleet are more sustainable than the current fleet serving the suburban network, as regenerative braking means up to 30% less energy is used, with electricity sent back into the conductor rail during braking and the trains also feature the very first bioreactor toilet on a train in the UK. CET toilets biologically and thermally treat waste to produce wastewater, which is compliant with EU bathing water standards, and cuts the need for frequent tanking associated with traditional train toilets. Reducing the volume of water needed for this activity, will support reduction in Scope 3 emissions and overall SWR’s Carbon Footprint.

4.3 Reducing Emissions at our Facilities

To meet our commitments, we must reduce emissions across the sites we run as well as from the operation of traction. In the previous financial year (FY 2023), SWR installed Building Management Systems (BMS) at our Wimbledon and Salisbury depots as well as Basingstoke and Winchester stations. These systems allow us to control our facilities intelligently and remotely, increasing energy efficiency by controlling heating and lighting more effectively. Our BMSs also make the detection of faults easier and give crucial data about a building's performance and energy usage.

By installing BMSs, we have the potential for savings of up to 30% of the gas consumption at depots and stations as well as 30% and 20% savings in electricity consumption in depots and stations respectively. This system will save an estimated 1,100MWh of energy and 6,000 tCO_2e of carbon emissions by 2040.

Another completed intervention is the installation of LED lighting at all SWR's 'front-of-house' locations. This includes all buildings that a customer would interact with, such as at stations. SWR aims to extend this scheme to 'back-of-house' premises including offices and depots, subject to funding.

GWR and Avanti have also sought to reduce emissions at our Facilities and during 2025, subject to funding, are looking to implement various emission savings at locations on the network. GWR is investigating solar PV feasibility at two depots which will have significant impacts on non-traction emissions.

AWC has plans in place to install LED lighting with lighting controls at select stations and Voltage Optimisation Units at four stations, designed to reduce the fluctuation in voltage delivered to equipment within the station which both improves energy efficiency and reduces wear on the asset. AWC also plans to fit an Air Source Heat Pump at one station following feasibility studies further reducing the non-traction contribution to their carbon footprint.

4.4 Digitalisation of our Railway

For our open-access operators Lumo and Hull Trains, we are planning to introduce new connected Driver Advisory Systems (c-DAS) on our trains. This system is programmed with route knowledge, such as the line speed and gradients, as well as vehicle capabilities such as the acceleration and braking. c-DAS crucially has data on the locations of other traffic on the network, which we can then use to calculate an appropriate speed for a train to travel at. This reduces the number of conflicts at junctions and hence the need for braking and acceleration. Therefore, our trains coast more often allowing for more efficient driving and consuming less energy during operations - hence reducing our carbon emissions.

4.5 Value Chain: Lowering carbon beyond our footprint

By transitioning to lower carbon modes of transportation, we help our customers to significantly reduce the emissions associated with their journey. We also continue building

collaborative relationships to support new research and development, access new technologies and accelerate the adoption of innovative approaches to decarbonise our operations.

Given the importance of modal shift, Hull Trains and Lumo have conducted studies in 2024 to quantify the carbon savings of using their rail services over driving or flying. Hull Trains' study, independently verified by Arup, demonstrates that a train journey from Hull to London King's Cross emits 12 times less CO_2 than driving, with only 5.42 $kgCO_2e$ compared to 67.2 $kgCO_2e$ by car. To promote awareness, Hull Trains has launched a 'travelling sustainably' webpage, allowing customers to see the CO_2 savings along their route to London King's Cross.

Using the methodology, we estimated that over FY 2023, Lumo helped customers to avoid emitting a total of 60.6 $ktCO_2e$ by using their rail services, which is equivalent to the annual GHG emissions generated by the combustion of over 25,000,000 litres of petrol or the energy consumed by 7,632 homes in a year.

5 Declaration and Sign Off

First Rail is committed to meeting the forecasted carbon reductions outlined in this plan.

"We recognise and welcome opportunities to invest in sustainable rail initiatives and support innovations such as this which create solutions to help improve rail's emissions and air quality, accelerating the transition to a zero-carbon world. Working with our industry partners ensures that we achieve a better environment for our customers and will further encourage them to switch from cars to trains, which have a lower environmental impact per passenger mile."

Steve Montgomery, Managing Director, **First Rail Holdings**

This Carbon Reduction Plan has been reviewed and approved by:

Steve Montgomery, Managing Director, First Rail

Date: 17/01/2025

Chris Maxwell, Safety and Environment Director, Great Western Railway

Date: 17/01/2025

Alex Foulds, Projects and Change Director, South Western Railway

Date: 17/01/2025

David Whitehouse, Safety, Security and Environment Director Avanti West Coast

Date: 17/01/2025

Martijn Gilbert, Managing Director, Hull and Lumo Trains

Date: 17/01/2025