Cabinet Office

Carbon Reduction Plan

Supplier name: Arriva UK Trains Limited

Publication date: 4th July 2024

1 Introduction

At Arriva UK Trains Limited (AUTL) we are committed to exemplary management of sustainability and this is a key element of our company strategy. We are currently developing our approach to respond to the requirements of the Corporate Social Responsibility Directive and related reporting standards. Part of this work will be the development of AUTL corporate and operating company carbon targets which are Science Based Target aligned. As we complete that work we will update this Carbon Reduction Plan.

2 Commitment to achieving Net Zero

AUTL is committed to mitigating climate change by achieving Net Zero emissions across Scopes 1, 2 and 3 by 2050 at the latest.

As part of developing our Net Zero pathway and the implementation of the Corporate Social Responsibility Directive requirements, we are committed to:

- Conducting a materiality assessment on our carbon emissions and setting appropriate targets along with key performance indicators to track progress. We will first publish these measures in 2026 for calendar year 2025. This will be reviewed annually for both materiality and objective setting as we reduce emissions.
- Fully quantifying our Category 4 - Upstream transportation and distribution, Category 5 - Waste generated in operation, Category 6 – Business travel and Category 7 – Employee commuting Scope 3 emissions. (Note we have scoped out Category 9 – Downstream transportation and distribution).

Our corporate targets will apply to each of our operating companies.

3 Baseline Emissions Footprint

Our baseline carbon emission are shown in Table 1. The baseline year is 2023.
Our figures include emissions from all our operating companies which at the time of writing are:

- CrossCountry – a DfT passenger rail franchise;

- Chiltern Railways (Chiltern) - a DfT passenger rail franchise;
- Arriva Rail London – a TfL London Overground passenger rail concession;
- Grand Central – an Open Access passenger train operator;
- Arriva TrainCare – a company providing maintenance for all forms of locomotives, rolling stock and track plant for both Arriva and other operators;
- Arriva UK Trains Ltd (AUTL) – the headquarters function of the Arriva UK Trains Ltd organisation.
- Arriva Road Transport Services - specialist rail replacement and passenger transport provider.

3.1 Scope 1 emissions

The majority (more than 99%) of our Scope 1 emissions relate to diesel fuel used for traction in three of our operating companies – CrossCountry, Grand Central and Chiltern.

Our biggest user of diesel fuel is CrossCountry with their diesel consumption accounting for over 70% of our Scope 1 emissions. At present most of the routes CrossCountry and Chiltern operate on are not electrified. Our Chiltern franchise currently uses HVO to fuel five locomotives which account for circa 6% of fuel consumption in the franchise and reduces our overall Scope 1 emissions by around 6%.

There are smaller sources of Scope 1 emissions from facilities heating at Arriva TrainCare and Chiltern depots and Arriva Rail London offices.

3.2 Scope 2 emissions

The majority (over 98%) of our Scope 2 emissions relate to electricity used for traction in our operating company Arriva Rail London as it operates electrified passenger services. Electricity for traction is supplied primarily by Network Rail and in small part by Transport for London (TfL). AUTL therefore does not have direct control over the carbon intensity of this electricity supply. It is understood TfL has a commitment to *“Transition to 100 per cent renewable energy supply by 2030, supporting our ambition for zero carbon across all activities”* through the purchase of renewable backed Power Purchase Agreements.

We also consume electricity at our stations, depots and offices. In all locations where we have control over the electricity supply (i.e. all locations other than where we are tenants), the electricity has been purchased from a renewable source since 2017 (i.e. using a green energy tariff).

3.3 Scope 3 emissions

We have not yet fully quantified our Scope 3 emissions. The baseline currently includes:

- **Category 4 - Upstream transportation and distribution** – this is incomplete but includes transportation emissions associated with delivery of key products to our depots and offices (principally diesel fuel and rail spare parts to depots) and rail replacement bus services.

- **Category 5 - Waste generated in operation** – this is incomplete at present. Analysis of Arriva Rail London waste and water data shows it is 0.12% of their footprint in 2023. For operating companies with diesel fleets, waste management and water emissions will likely be <0.1% of their footprint and therefore a very minor emission source. Most operating companies collect waste data but it is not centrally collated. This will be improved and included in the next update to this CRP.
- **Category 6 – Business travel** – this includes all business travel excluding rail travel using rail passes as these journeys are not currently tracked.
- **Category 7 – Employee commuting –** this is complete.

Our Scope 3 emissions do not include Category 9 – Downstream transportation and distribution as this has been scoped out for our operations.

Table 1 – Arriva Trains UK Ltd Baseline CO_2e emissions

Baseline Year: 2023	
Additional Details relating to the Baseline Emissions calculations.	
Scope 3 emissions are partially complete and exclude Category 9 emissions and these are scoped out.	
Baseline year emissions:	
EMISSIONS	**TOTAL (tCO_2e)**
Scope 1	**224,671**
Scope 2	**33,901**
Scope 3 **(Included Sources)**	**11,963**
Total Emissions	**270,535**

4 Current Emissions Reporting

As this is the first year of reporting for AUTL in this way the current emissions reporting is the same as baseline.

Reporting Year: 2023	
EMISSIONS	**TOTAL (tCO_2e)**

Scope 1	**224,671**
Scope 2	**33,901**
Scope 3 **(Included Sources)**	**11,963**
Total Emissions	**270,535**

5 Emissions Reduction Targets

We are cognisant and supportive of the Net Zero targets set by the UK Government and devolved administrations in which we operate namely:

- The UK Government target of achieving Net Zero carbon by 2050;
- The Scottish Government target of achieving Net Zero by 2045; and
- The Mayor of London's target of achieving Net Zero by 2030.

We have been working to reduce our energy consumption and carbon emissions for a number of years as can be seen in the section "Carbon Reduction Projects". In order to continue our progress and push towards achieving Net Zero, we have adopted the following carbon reduction targets:

1. **Net Zero by 2050.**
2. **Net Zero by 2045 for the portion of CrossCountry emissions in Scotland.**
3. **Arriva Rail London Net Zero by 2030 in line with London Mayoral target (Note this assumes traction electricity supplied by TfL and NR is net zero by 2030).**
4. **Create a footprint for CrossCountry emissions in Scotland to be included in the next update of the CRP.**

We are committed to bringing our targets forward and delivering Net Zero as early as practicable as we know that early action is imperative to avoid the worst impacts of climate change. We do though acknowledge that in order for us to achieve or exceed our targets we will need support, collaboration and action from other parties to avoid and reduce emissions which are beyond our control. Given all of our high carbon fleet (diesel trains) are scheduled for renewal by 2040, we are focussed on seizing the opportunity these renewals present to ensure new fleet is the lowest carbon option it can be. To be able to secure these long-term benefits in some cases we may need to work to extend the life of the existing fleet while lower carbon options are developed and procured.

We project that carbon emissions will decrease over the next five years to 17,235 tCO_2e by 2028. This is a reduction of 6.4%. Excluding emissions from diesel trains, which we acknowledge are challenging to decarbonise in the short term, this represents a reduction in emissions of 36.3%. The reductions are predominated by reductions in traction energy emissions for Arriva Rail London, which have been forecast using Government factors for electricity grid decarbonisation.

As explained above, diesel and electricity used for traction are the source of the majority of our emissions. We have developed a four-stage strategic approach to reducing traction emissions over time as illustrated in Figure 1 below.

- Stages 1 and 2 are shorter-term behavioural and lower cost investment projects.
- Stages 3 and 4 are longer-term investment strategies, reliant on large fleet collaborative projects between Clients, Fleet Owners and Infrastructure Partners. Decisions on Stages 3 and 4 at all of our businesses except Grand Central are reserved for our clients.

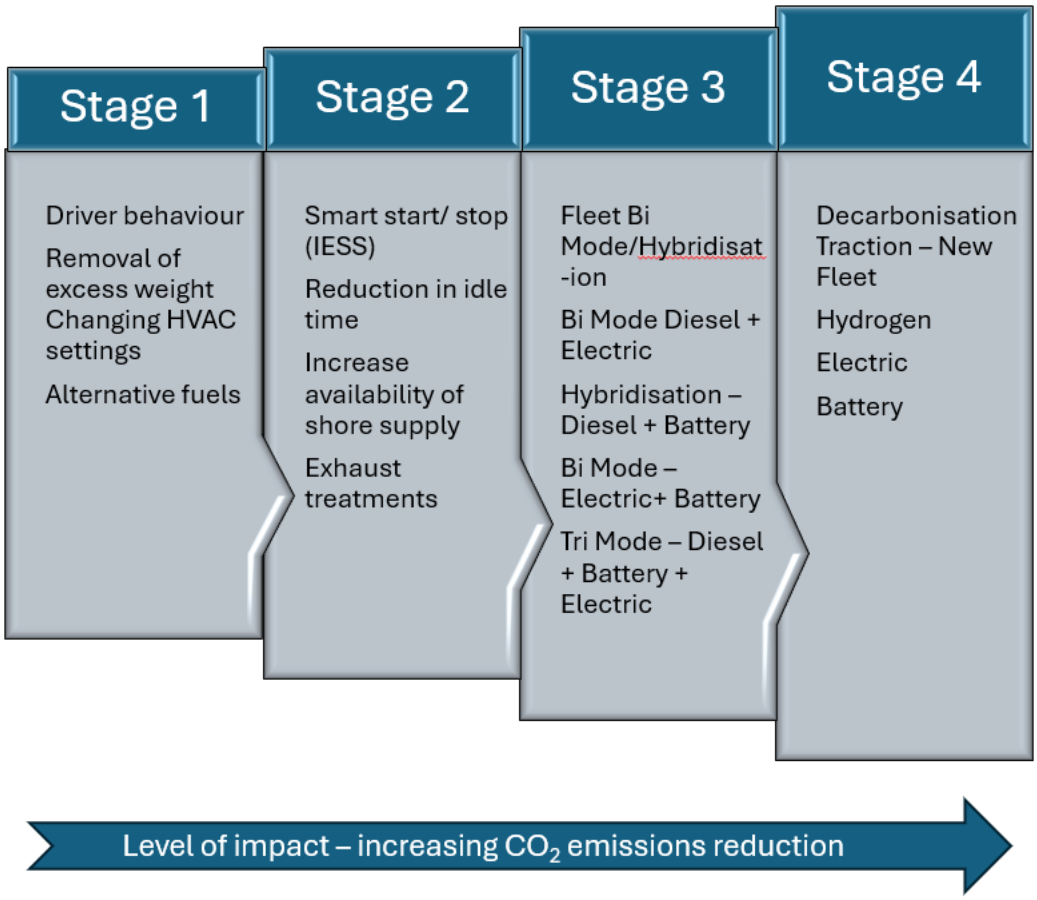

Figure 1 - AUTL four stage traction decarbonisation approach

We have set out forecast emissions trajectories for all of our emissions including traction and also for our emissions excluding traction so that the non-traction element can be seen. For traction we have set out a potential decarbonisation trajectory based on three stages of intervention aligned with those shown in Figure 1. The resultant traction emissions trajectories are shown in Figure 2 below.

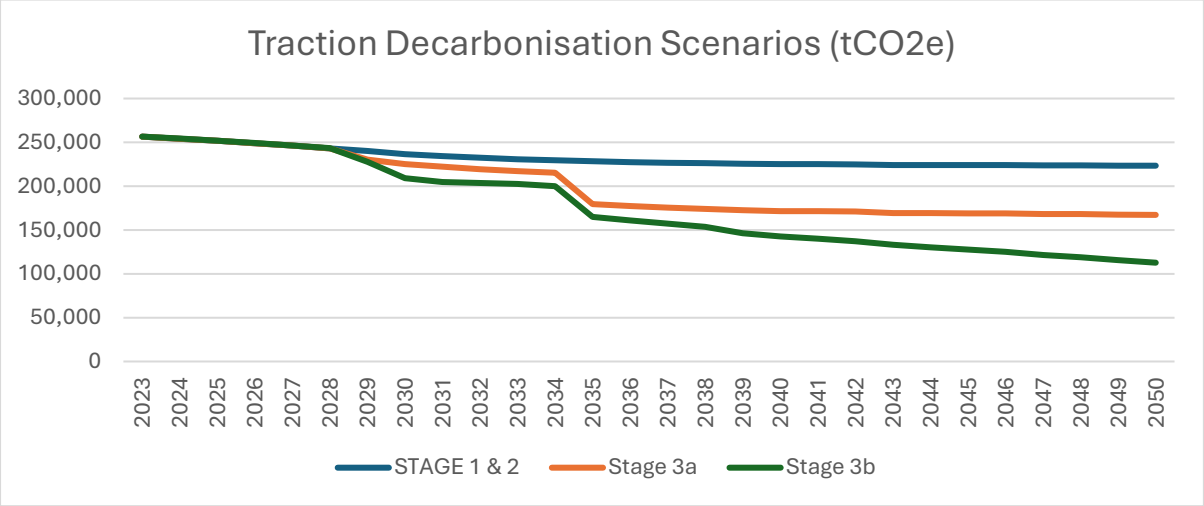

Figure 2 - Forecast carbon emissions from all sources showing three stages of decarbonisation

The three stages of traction decarbonisation are as follows:

- Stage 1 and 2: assuming we complete Stages 1 and 2 in relation to traction efficiency (Figure 1) but that the power source for diesel trains does not change;
- Stage 3a - assuming we partially implement Stage 3 of our strategy with the replacement of our fleet with diesel/pantograph bi-mode units as they come up for renewal, making use of the existing electrified rail network (CrossCountry and Grand Central only); and
- Stage 3b – assuming we fully implement Stage 3 of our strategy with the introduction of short-range battery trains and bi-mode units, potential battery/pantograph bi-mode units and hybridisation and additional network electrification.

There are potential inflection points in our trajectory when diesel fleets become life expired and are due for renewal. The trajectories for Stage 3a and 3b illustrate the different timings and fuel choices for fleet replacement could have. We anticipate the need to renew the Chiltern fleet from 2031 to 2039; Grand Central from 2029 and CrossCountry from 2031 to 2035. However, as the lead time for new fleet procurement and mobilisation is four to five years it is likely that some of our diesel fleet will remain in use beyond these dates. We are also considering options to extend the life of some of our existing fleet by a few years to allow time to develop and procure lower carbon technologies. Whilst this may result in higher short-term Scope 1 emissions, it will likely lead to lower carbon outcomes in the long term and much lower emission in 2050.

The second largest source of emissions is electricity for traction which, as set out in section 3.2, is beyond our control as traction electricity used by our fleet is owned by Network Rail and TfL.

Addressing these two issues will form part of the wider strategic approach by rail industry stakeholders including our clients (DfT and TfL), our industry partners and our supply chain and we are fully committed to participating proactively in that process.

Our trajectory excluding traction emissions is shown in the graph below. This includes gas for heating and company cars (Scope 1), non-traction electricity (Scope 2), and upstream transport, business travel and employee commuting (Scope 3).

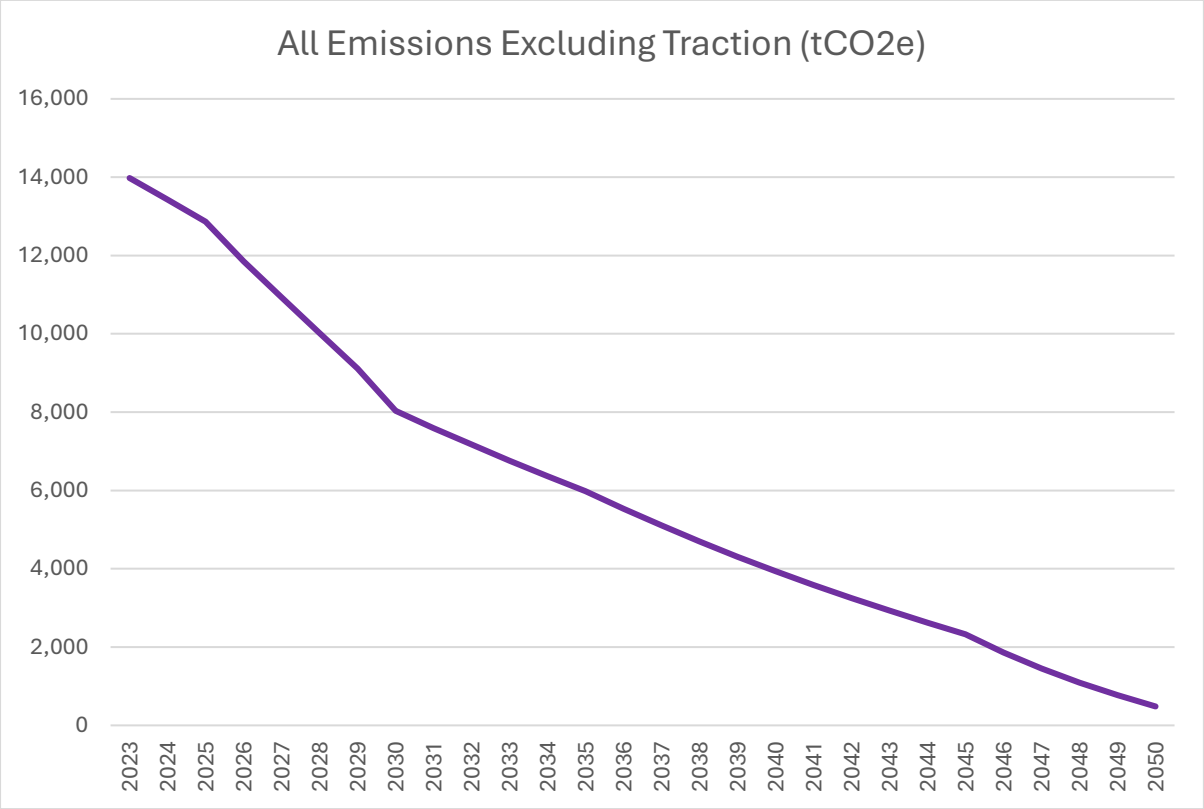

Figure 3 - AUTL carbon trajectory – non traction emissions only

This trajectory is based on the assumptions that Arriva Rail London diesel vans will be replaced by 2025, all gas boilers will be phased out between 2025 and 2030, non-traction energy is from a renewable tariff, employee commuting and business travel for Arriva Rail London will decarbonise to net zero 2030 and business travel for the rest of our business will decarbonise to zero by 2050. Discussion on our commitments to these measures and efforts to accelerate decarbonisation compared to the trajectory shown is included in Section 6 and Section 7.

The assumptions involved in the calculation of our emissions trajectories include the gradual decarbonisation of the UK rail electricity supply as set out in the DfT's Transport Assessment Guidance (TAG) databook Table A3.3 and the implementation of currently planned initiatives.

6 Carbon Reduction Projects

In excess of 96% of our total emissions relate to traction energy, both diesel and electrical. We therefore focus a lot of our attention on reducing traction energy consumption and decarbonisation of power sources. We also recognise the need to address our other sources of emissions, from our offices, stations and depots (non-traction emissions) and our supply chains where we have greater control.

6.1 Completed Carbon Reduction Initiatives

Although we have not previously published an AUTL CRP we have been working to reduce energy consumption and carbon emissions for several years through the following environmental management measures and fleet related projects which have been completed through our 4 step process set out in Figure 1.

6.1.1 Traction Emissions (Scope 1 and 2)

6.1.1.1 Stage 1 initiatives

Driver Behaviour

We introduced Driver Advisory Services on the majority of our fleet through 2017 and this has been utilised for many years. The expected benefit of this service is 2% to 4% reduction in fuel consumption. All benefits of this system are now captured within our annual fuel consumption data.

Removal of excess weight

We achieved a weight reduction, including reduction in fuel tank size, on CrossCountry's Voyager fleet of a total of 9.5 tonnes per 5-car Voyager, saving 1.7 kilotonnes CO_2e per 5 car Voyager over the contract life.

Using Alternative Fuels

We have trialled various alternative fuels across our businesses:

- CrossCountry - Gas to Liquid.
- Grand Central - Liquid natural gas.
- Chiltern - Hydrocarbon treated Vegetable Oil (HVO).

As a result of the trials we have implemented HVO at Chiltern on our Class 68 fleet which comprises five locomotives and approximately 6% of fuel consumption within Chiltern. Use of HVO reduced emissions by 1.43 kilotonnes of CO_2e in 2023 which was not a full year of operation. It is estimated that from 2024 onwards use of HVO will save approximately 2.75 ktonnes of CO_2e each year. HVO delivers a 90% net reduction in CO_2 emissions and reduces hazardous particulates in stations.

Changing Heating, Ventilation and Air Conditioning (HVAC) settings

We have conducted studies on HVAC usage on our trains and determined the optimal seasonal settings for the HVAC system. Across CrossCountry' and Chiltern's fleet we have saved 555k litres of fuel per year and an annual CO_2e saving of 1.48 ktonnes.

6.1.1.2 Stage 2 Initiatives

Implementation of Intelligent Engine Stop/Start (IESS)

We have implemented IESS on our CrossCountry Voyager fleet. It will automatically turn engines off when in stations, stopped at signals, depots and during the course of a diagram, with the appropriate number of engines running in each section. This reduces wear on the engine, saves fuel and reduces emissions. We estimate that this will save 750k litres of fuel and 1.99 ktonnes of CO_2e per year once operational. The system upgrade has been fitted to the whole fleet but is currently enacted on 12 Voyager units only for a trial period to gather data on how the system interacts with the DAS system. The aim is for the full fleet to be enacted when the data is reviewed to ensure this works, and when operational familiarity is widespread across our pool of drivers.

Reduce Engine Idling

All of our businesses have idling policies in place and these are regularly enforced. We have encouraged the maintainer of Grand Central's Class 180 fleet to turn off engines overnight. On average, per year this saves 6,466 engine hours per year which equates to 0.26 ktonnes of CO_2e saved per annum.

6.1.1.3 Stage 3 initiatives

Diesel replacement trials

Chiltern has been an industry innovator introducing new technology to replace diesel traction. In collaboration with Porterbrook Leasing and Rolls-Royce, Chiltern converted a Class 168 diesel multiple unit into a hybrid unit and successfully ran it in passenger operation as a 2-year trial. Although the technology was successful, the post-Covid supply world meant that the conversion could not be made commercially viable for a full fleet transition, particularly given the age of the fleet. Despite this, the advances made, and the experience gained will be crucial in helping the industry to further develop this technology and it should lead to much better products for all operators.

6.1.1.4 Stage 4 initiatives

Electrification

At CrossCountry and Chiltern we continue to further the business cases for decarbonised transport. At present CrossCountry operate an estimated 24% of journeys under electrified infrastructure. Chiltern operate no services under overhead electrification. We have conducted studies at Chiltern on the operation of a battery based train including infrastructure options. This has helped informed our business case options for our regional services. As a result, we are closely monitoring the development of battery and hydrogen technology as this may provide a solution in the future for non-electrified sections of the UK rail network.

6.1.2 Emissions at our facilities

Renewable energy purchase

Since 2017 our corporate procurement has purchased green electricity. This is the supply used at all of our sites where we control the procurement of electricity. There are a small number of sites where we are tenants and are unable to control the carbon intensity of electricity at present. In 2023 90% of our total non-traction electricity consumption was

covered by the green electricity tariff. We hope to extend the green electricity tariff to more of our facilities as opportunities arise in future through asset renewals.

6.2 Planned Carbon Reduction Initiatives

We will continue to progress our four-stage strategic approach to traction emissions and continue to develop and implement projects to quantify, understand and reduce our non-traction and supply chain emissions including measure such as:

6.2.1 Traction Emissions

6.2.1.1 Stage 1

Connected Driver Advisory Systems (CDAS)
We are evaluating a second generation DAS product, CDAS, on our trains in CrossCountry, Chiltern and Grand Central. 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. It also has data on the locations of other traffic on the network, which we can use to calculate the appropriate speed for our trains to travel at. This reduces the number of conflicts at junctions and hence the need for braking and acceleration. This enables our trains to be driven in the most energy efficient way thereby reducing carbon emissions.

Using Alternative Fuels

CrossCountry are also using the outputs of Chiltern's alternative fuel trials to explore the use of HVO on Voyagers to further reduce emissions. Our trial of Gas to Liquid on Class 170s in 2023 returned no negative impacts on engine wear or performance, which saw the use of this fuel and HVO approved for use across both CrossCountry fleets. Once market conditions and supply chains are improved, there is a commitment to expand the use of these fuels in the future.

6.2.1.2 Stage 2

Shore Supply
CrossCountry are exploring fitment of Shore Supply equipment to the Class 170 fleet to enable these units to be cleaned, serviced and maintained without the need to run engines whilst on the depot. The infrastructure could be fitted at key depots which would allow the CrossCountry fleet to benefit from reduced engine wear and fuel use, as well as improving air quality for the local area. A business case will be presented for approval in 2025 for a full fleet fitment.

Roll out of IESS
CrossCountry plan to enable IESS on the full fleet of Voyagers pending successful outcome of the trial period. This will return benefits in reduced fuel usage, engine wear and emissions across the network, particularly improving air pollutant and noise emissions in stations across our route.

6.2.1.3 Stage 3 and 4

Fleet changes
Whilst specific technological options may still be unclear we have a line of sight for the replacement of existing CrossCountry, Chiltern and Grand Central fleets at the end of their operational lives, which will be well before 2050. We anticipate changes in the fleet we use as follows:

- CrossCountry – new bi-mode trains forecast in the period 2031 to 2035.

- Chiltern – replacement of Class 165 trains in 2031, Class 168 trains in 2034 and Class 68 MkIII locomotives in 2027.
- Grand Central – new bi-mode trains forecast 2029.

For Grand Central, the pathway is quite clear as 80% of Grand Central routes are electrified we are able to upgrade to either diesel/pantograph or preferably battery/pantograph bi-mode units to serve this open access operation.

For CrossCountry, fleet replacement with diesel/pantograph bi-modes is the current likely option due to long sections of CrossCountry routes in rural areas being unsuitable for overhead electrification and outside the range of emerging battery trains. The alternative option for this fleet avoiding the use of diesel is in Stage 4 (Figure 1) requiring untrialled future technologies such as hydrogen. Extending the life of the CrossCountry fleet to allow time for such technologies to be available is an option.

Currently none of the Chiltern network is electrified and fleet replacement will focus on small battery trains for commuter routes and diesel/battery bi-modes. Future hydrogen, discontinuous electrification or long-range battery trains may be necessary to fully decarbonise the Chiltern routes.

Industry Collaboration
As previously set out Stage 3 and 4 projects require significant industry collaboration and we are active in many industry groups, some examples of these are

Industry Groups
AUTL is represented on many industry groups driving the decarbonisation of rail including:

- **Sustainable Rail Executive -** Managing Director, Chiltern.
- **Sustainable Rail Leadership Group (SRLG)** – Head of ESG, Arriva Rail London and Managing Director, Chiltern.
- **Decarbonisation Working Group** –Head of Rail Commercial AUTL and Environment & Sustainability Manager, CrossCountry.
- **Rail Environment Forum (REF)** - Environment & Sustainability Manager, CrossCountry; and Head of Safety, Grand Central.
- **RSSB Rail Carbon Accounting Framework steering group** - Environment & Sustainability Manager, CrossCountry.

Network Rail
We are engaging with Network Rail to encourage them to reduce the carbon intensity of traction electricity more quickly than the forecast average UK grid decarbonisation trajectory.

Transport for London / Rail for London
We are engaging with TfL and RfL to encourage them to reduce the carbon intensity of traction electricity and understand they are committed to procuring all electricity via renewable-backed PPAs by 2030.

Industry Partners and Collaboration Rail Delivery Group
We are engaging with industry partners such as Network Rail, DfT and GBRTT to explore and encourage options for reducing carbon intensity on the rail network across all of our routes. This includes technologies that are route specific recognising Arriva operates a varied route network. In addition, our Managing Director, David Brown, is providing industry leadership through his current role as Chair of the Rail Delivery Group.

6.2.2 Emissions at our facilities

Net Zero Scope 1 emissions

Arriva Rail London has plans to reduce their Scope 1 emissions to Net Zero by 2025 through the removal of remaining gas boilers and transitioning road fleet to EVs.

6.2.3 Scope 3 emissions

As part of our work to implement the Corporate Social Responsibility Directive and develop our corporate Net Zero pathway we are committed to fully quantifying our Scope 3, category 4, 5, 6 and 7 emissions and setting targets to reduce these to Net Zero.

7 Declaration and Sign Off

This Carbon Reduction Plan has been completed in accordance with PPN 06/21 and associated guidance and reporting standard for Carbon Reduction Plans.

Emissions have been reported and recorded in accordance with the published reporting standard for Carbon Reduction Plans and the GHG Reporting Protocol corporate standard[1] and uses the appropriate Government emission conversion factors for greenhouse gas company reporting[2].

Scope 1 and Scope 2 emissions have been reported in accordance with SECR requirements, and the required subset of Scope 3 emissions have been reported in accordance with the published reporting standard for Carbon Reduction Plans and the Corporate Value Chain (Scope 3) Standard[3].

This Carbon Reduction Plan has been reviewed and signed off by the board of directors (or equivalent management body).

7.1.1.1 Signed on behalf of the Supplier:

Date: 04/07/2024

[1] https://ghgprotocol.org/corporate-standard
[2] https://www.gov.uk/government/collections/government-conversion-factors-for-company-reporting
[3] https://ghgprotocol.org/standards/scope-3-standard