national highways

Net zero highways

Data method statement

July 2026

Introduction

This document outlines the methods that we have used to account for emissions of the 2019/2020 baseline and subsequent reporting years as reported in our Net Zero Plan (NZP)[1]. This method statement provides an update to the previous version dated August 2024 and includes the key changes and challenges and covers the three following areas of carbon emissions:

Corporate: Emissions from our own operations such as energy across our estate, network lighting, and corporate purchases, for example office supplies and gritting salt for the network, business travel and commuting.

Construction and Maintenance: Emissions from our capital works supply chain. This includes emissions 'embodied' in materials, emissions from the transport of materials to and from site, and the use of construction plant, for both new construction and maintenance activities. In addition, this category also includes energy use where the supply chain is managing sections of the network under Design Build Finance Operate contracts.

Road User: Emissions generated by vehicles using the strategic road network. These emissions are not required to be included within National Highway's Carbon footprint, as they fall outside of the minimum boundary as defined by the Greenhouse Gas (GHG) protocol corporate standard[2]. However, these have been included as we have some influence over emissions from Road Users.

Quantification and measurement methods for carbon emissions have improved since we first reported in 2021. For this reason, we have re-baselined twice and updated our methodology to include changes such as moving from calendar year to financial year and expanding our emissions boundary. Regularly reviewing and refining our emissions baseline is best practice and ensures we remain accurate, transparent and credible.

Our annual Net Zero Progress Reports (available on our website) demonstrate our progress towards our net zero goals. Due to carrying out re-baselining activity the data published in the 2020 NZP and 2020/2021 Annual Progress Update is not comparable to the data published in Annual progress reports from 2022.

[1] National Highways Net Zero Carbon Plan 2030-2040-2050 net-zero-highways-our-2030-2040-2050-plan.pdf

[2] GHG Protocol Corporate Standard. Corporate Standard | Greenhouse Gas Protocol (ghgprotocol.org)

Corporate

Net Zero Plan Baseline 2019/2020

Scope and Data

Our corporate emissions are reported according to the GHG Protocol Corporate Standard[2] and the Science Based Target Imitative (SBTi) Guidance[3], which has been used to determine which Scope 3 emissions sources to include within the corporate carbon footprint, alongside Scope 1 and 2 emissions. The 2024 rebaseline which occurred through the SBTi verification process included the following changes:

Improved Data:

- Electricity calculated using a market based, rather than a location based methodology;
- Well-to-tank emissions included for all travel-based emission sources;
- Well-to-tank for NHs own electricity consumption; and
- Use of DEFRA spend emission factors.

Additional Emission sources:

- Business trips (subsistence and parking) in business travel;
- Downstream transportation and distribution: Salt; and
- Included emissions from all assets we lease (e.g., residential and commercial properties).

Overall, the rebaselining process resulted in significant changes in three key areas: Business Travel, Corporate Purchases, and Leased Assets and expanded our carbon footprint to include more scope 3 emissions.

Data Collection:

The key data was collected and collated from teams responsible for key activities within National Highways. This baseline was supplemented by proxy data (based on available information and industry emission factor benchmarks to gauge materiality) to ensure alignment of corporate emissions to the SBTi Net Zero scope, as summarised below:

Scope 1 (including upstream ("well-to-tank") emissions)

- Building Heating and Cooling – Fuel type and fuel usage/quantity (kWh, litre);
- Light Vehicle – Vehicle type and vehicle travel distance (miles, km); and
- Heavy Vehicle – Vehicle type and vehicle mileage (miles, km).

Scope 2 (including upstream ("well-to-tank") emissions and transport and distribution emissions)

- Strategic Road Network (SRN) electricity use – Electricity generation source and electricity usage/quantity (kWh); and
- Estates electricity use – Electricity generation source and electricity usage/quantity (kWh).

Scope 3 (estimated where based on available information and industry emission factor benchmarks to gauge materiality)

[3] Science Based Targets initiative Net-Zero - Science Based Targets

- Corporate purchases – Financial spend data on professional services, business trip accommodation, subsistence and parking. Then also quantity of goods purchased e.g. salt, IT equipment and vehicles procured.
- Fuel and energy related activities – Fuel and energy type, and fuel and energy usage/quantity (kWh, litre);
- Waste generated in operations – Waste type and waste quantity (tonnes);
- Business Travel - Vehicle type, and vehicle travel distance (miles, km; including upstream ("well-to-tank") emissions);
- Employee Commuting and Homeworking – Commuter mode, commuter distance and time spent working from home;
- Upstream Leased Assets – Data centre energy type and usage, and landlord-controlled energy supplies and cooling (estimated); and
- Downstream Leased Assets – Motorway Service Area and Managed Property Portfolio energy type and energy usage/quantity.

Carbon Removals and Offsets:

- Carbon Sequestration from NH estate. Data includes habitat type and area. It is estimated 8,000 hectares of forest based on our geographic information system (GIS) data and application of Woodland Carbon Code calculator method to estimate tCO2/year absorbed.

Calculation Methodology

To help us understand our baseline, the input data is multiplied by GHG emissions factors. Emission factors were collected from industry standard databases including but not limited to UK Government Greenhouse gas reporting: Conversion Factors, Bath Inventory of Carbon and Energy, Association of Issuing Bodies. Emissions are reported in carbon dioxide equivalent emissions (CO_2e).

External Factors Modelling

Department for Environment, Food & Rural Affairs (DEFRA) GHG Reporting Guidance[4] was used for historical emissions factors for electricity and other fuels. Department for Business, Energy & Industrial Strategy (BEIS) long-run marginal forecasts are used for grid electricity emission to account for grid decarbonisation. WebTAG Databooks are used to provide changes in vehicle efficiency. Incorporation of carbon reduction trajectories for key industries including hospitality, vehicle manufacturing, data centres, motorway service area providers, and rail travel.

Assumptions and limitations

The following assumptions were made based on industry benchmarks and professional judgement:

- There is limited metering of our network electricity usage, so where primary data is not attainable, estimations have been used. This is an area for ongoing validation;
- There is currently limited understanding on the impact of the digitisation and effect on data centre requirements; and
- There is currently limited understanding on the impact of electric charging facilities on National Highways estate and Motorway Service Areas.

[4] DEFRA Guidance on how to measure and report your greenhouse gas emissions - GOV.UK (www.gov.uk)

Annual Progress Update 2024/2025 and 2025/2026

The following provides any updates made to the Scope and Data, Calculation Methodology, and Action Quantification and any associated assumptions and limitations made.

Scope and Data

No updates to the underlying scope and data have been required during the 2024/2025 and 2025/26 Annual Progress Update.

Calculation Methodology

Updated emission factors have been used reflecting the latest published figures and where appropriate, are more applicable to National Highways activity. Updates to methodology in 2025/26 include:

- Use of updated AIB emission factor for MSA electricity;
- Change of emission factor for salt (reducing embodied carbon from proxy data that was previously used, resulted in reducing emissions with corporate purchases); and
- Change of emission factor for salt haulage type (reducing emissions associated with Transportation and Distribution emission category).

Construction and Maintenance

Emissions from our construction and maintenance supply chain covers the manufacture, transport and use of materials such as asphalt, cement, concrete and steel on our network.

Net Zero Plan Baseline

2019/2020 Baseline

The following key data sources have been used:

- Construction and maintenance supply chain National Highways Carbon Tool[5] outputs from financial years 2011-12 to 2023-24;
- Major Project scheme pipeline from 2013 to 2030, covering RIS3; and
- Major Project Environmental Statements.

The principal data source for the baseline is the carbon returns that construction and maintenance supply chain create using the National Highways Carbon Tool. Where the carbon returns were not complete or sufficiently robust, we supplemented this with the GHG emissions data declared within the project's Environmental Statements or we have calculated GHG emissions using the projects material bill of quantities. The resultant dataset was compiled and summarised by contract type, project type, material type and emissions source. The following section sets out how we used this data to model future performance to create a baseline forecast. The baseline has been created for the 2019/20 financial year.

Major Projects Baseline Forecast

The carbon impact of construction is dependent on what is built, so we needed a measure of the average carbon efficiency of construction to compare performance over time (and between different projects), and to produce forecasts.

To establish a measure of carbon efficiency the total carbon impact (tCO_2e) was divided by the total major projects' length (lane km). This gives a carbon intensity indicating the carbon emissions per lane km (tCO_2e/lane km). See below.

$$\frac{\sum Carbon\ impact\ from\ major\ projects}{\sum Lane\ km\ from\ major\ projects} = Carbon\ impact\ per\ lane\ km$$

This analysis was conducted for each category of major projects:

- Widening
- Junctions
- Complex Infrastructure Projects (CIPs)

[5] Carbon emissions calculation tool: National Highways Carbon emissions calculation tool

- Smart Motorway[6]
- Bypass
- All Lane Running (ALR) Retrofit6

An overall average for performance was calculated across all project categories. To forecast future emissions a five-year rolling average was applied. The CIPs were added discreetly on top of the rolling average as this project type is built on an ad hoc basis due to their size. This also allows for future CIPs to be added to the model as they arise.

Maintenance Contracts

There are two primary types of maintenance contract that we have, regional area maintenance and DBFO contracts.

Both contracts have the same sources of maintenance GHG emissions, with the exception of operational energy usage, such as lighting and variable message signs, which is only included for DBFO contracts. Operational energy usage for all other parts of the SRN outside of the DBFO contract is included within our corporate scope of GHG emissions. DBFO operational energy use has been estimated based on the average from other areas of the network currently under National Highway's control.

Total Construction and Maintenance Emissions Baseline

The combined construction and maintenance supply chain emissions baseline was summarised by source of emissions, based on the average split across all contract types:

- On site plant;
- DBFO operational energy;
- Material transport;
- Materials:
    - Concrete;
    - Cement;
    - Steel;
    - Asphalt;
    - Aggregates;
    - and other.

Assumptions

- The total carbon emissions for each project have been applied evenly over the total years of construction;
- A 5-year rolling average carbon footprint for maintenance and the DBFO contract works has been used to project emissions forward to 2050; and
- All DBFO operational electricity will return under the control of National Highways after the contract end years.

Limitations

- Not all suppliers are currently reporting their National Highways Carbon Tool data correctly e.g., misreporting, late reporting or not reporting. To address this, bill of quantity data and Environmental Statement carbon assessments were used to supplement the data and fill in gaps.

[6] All Smart Motorway and ALR Retrofits have been cancelled. Emissions provided by the supply chain have been included in the model, but these are no longer included in our forecasting.

- A location based[7] approach has been taken to estimate the GHG emissions for the operational electricity use by DBFO contracts using grid average emission factors. Therefore, this does not consider DBFO contracts using green energy tariffs. The future decarbonisation of the grid has been taken into consideration using the UK Government Green Book[8] greenhouse gas emission factors.

Annual Progress Reporting 2025/2026

Data Sources

In addition to the data sources used to establish the baseline and forecast, the following key inputs are used to report annual progress:

- Construction and maintenance annual supply chain actual carbon returns, covering Major Projects, Operations/Regional Maintenance, and DBFO.
- An updated Major Projects (MP) scheme pipeline, including revised dates and project status.
- Financial data covering categories such as consultancy costs, protective clothing, uniforms, and other relevant expenditures.

Methodology

The baseline methodology has been carried forward for the annual progress assessment, with the integration of the latest available actual carbon returns from our supply chain.

For Major Projects, this includes reviewing and updating the scheme list to ensure it accurately reflects live projects. This process improves the accuracy of annual reporting by ensuring all relevant schemes are captured, resulting in a more robust estimate of associated emissions for the reporting year. Actual returns are then incorporated to replace estimates where possible.

For Regional Maintenance and DBFO, emissions are calculated using actual returns submitted by the supply chain for that year.

Emissions associated with capital and purchased goods and services are estimated using spend-based data provided by the Corporate Carbon Team, combined with appropriate emission factors.

FBS depot emissions are estimated using a carbon benchmark derived from previous depot construction projects, alongside the average number of new-build depots delivered annually.

Assumptions

- Where actual returns are submitted for Major Projects but project dates indicate that schemes were not live, these discrepancies are assumed to be errors and the returns are included in the analysis. This ensures that emissions are not missed due to changes in scheme delivery dates.
- The FBS depot benchmark is based on calculations derived from previous construction projects and is considered representative of current builds.

[7] A location-based method reflects the average emissions intensity of grids on which energy consumption occurs (using mostly grid-average emission factor data). GHG Protocol, Scope 2 Guidance (2015): accessed online at: https://ghgprotocol.org/sites/default/files/Scope2_ExecSum_Final.pdf

[8] Department for Business, Energy & Industrial Strategy, IAG spreadsheet toolkit for valuing changes in greenhouse gas emissions (2019): accessed online at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/873679/toolkit-for-valuing-changes-greenhouse-gas-emissions.xlsm

Limitations

- While the quality of reported carbon returns has improved year-on-year, earlier datasets may have been subject to underreporting. To address this, actual emissions data have continued to be incorporated into our forecasting model to smooth inconsistencies and provide a more robust and conservative estimate of annual emissions.
- For consistency in reporting, our previous modelling approach has been applied for the FY2025/26 reporting period. As data quality continues to improve, future reporting will transition towards methodologies that rely more directly on verified actual emissions data.
- Material splits are based on supply chain averages rather than project-specific annual data. This may limit the precision of emissions attribution at a detailed level.

Error! Bookmark not defined.Error! Bookmark not defined.Road User

Policy Background

The UK Government's policy on decarbonising road transport, as set out in the Transport Decarbonisation Plan (TDP) and reinforced by the Zero Emission Vehicle (ZEV) mandate, centres on rapidly transitioning to a zero-emission vehicle fleet.

The ZEV mandate is the UK Government's primary policy mechanism for promoting the uptake of zero emission cars and vans. Vehicle manufacturers are mandated to increase the proportion of their new sales to be zero emissions, thereby accelerating the transition to net zero for road users. The latest release of Defra's Emissions Factors Toolkit (EFT v14) reflects the ZEV mandate through the increasing proportion of electric vehicles represented within the fleet data included in the tool.

The DfT's TDP sets out what government, business and society will need to do to deliver the significant emissions reduction needed across all modes of transport, putting the UK on a pathway to achieving carbon budgets and net zero emissions by 2050. However, the projections underpinning the TDP are not incorporated into the EFT and are therefore not part of the methodology to calculate the reported annual emissions.

Many of the actions required to deliver net zero road user emissions by 2050 are being progressed by government and are out of our direct control, for example vehicle emission standards. Our priorities are to help support government's objectives by tackling carbon emissions from HGVs and facilitating the uptake of electric cars and vans.

Scope and Data

The GHG emissions reported in the road user theme in National Highways' Net Zero Plan are carbon dioxide equivalent emissions (CO_2e) released at the tailpipe from vehicles travelling on the SRN.

The primary sources of data for calculating road user emissions from the SRN are traffic data outputs from National Highways' five regional transport models (RTMs) and the Emission Factor Toolkit (EFT) model. We use modelled traffic data as we do not have sufficient actual observed traffic data across all our network to calculate the CO_2e emissions for road users on our network.

The five RTMs cover our entire network and include the impact of new investments, policy changes and changes in travel demand on traffic flows and speeds.

Method

The RTMs provide modelled traffic data, including traffic flows and speeds etc, for years 2019, 2025 and 2031. The traffic outputs for these 3 years from the RTMs have been entered into National Highways' Speed Band tool, which is derived from the latest version of EFT, to calculate the annual CO_2e estimates for road users for the corresponding year.

As the RTMs only provide outputs for 2019, 2025 and 2031, the CO_2e emissions for the intervening years have been calculated assuming a linear profile between the 3 modelled years.

The annual CO_2e emissions have been split by Light Duty Vehicles (LDVs) – cars and vans and Heavy-Duty Vehicles (HDVs) - consisting of heavy goods vehicles, buses and coaches.

Since we report emissions on a financial year basis, we calculate the reported emissions by taking three-quarters of the annual emissions from the preceding year and adding one-quarter of the annual emissions from the current year. For 2025/26, emissions are therefore calculated as three-quarters of the 2025 total (covering April to December) plus one-quarter of the 2026 total (covering January to March).

Baseline

The baseline (2019/20) used for road user, was updated in 2022/23 to take account of new vehicle emission factors, updates to the traffic modelling and takes account of the impact of the COVID 19 pandemic made to traffic flows in 2020. The 2019/20 baseline has not been updated following the release of the latest emission factors (EFT v14).

Assumptions

- Modelled traffic data is based on the DfT's 'Core Scenario', which is recognised as the most realistic and plausible growth scenario of how travel demand and transport system will evolve and is commonly used in transport appraisal for scheme assessments. This means:
    - Estimates of traffic growth reflect 'central' projections of economic growth, population and fuel prices;
    - Changes in traffic flows and traffic speeds reflect published plans for improvements to the SRN and wider government policy commitments;
    - Traffic composition and fleet composition changes reflect published policy commitments such as the ZEV mandate.
    - Assumes an increase in vehicle km travelled on the SRN over time.
- The ZEV mandate assumes an increase in vehicles that are zero emission at the tailpipe over time.

Limitations

The estimation of road user carbon emissions is subject to inherent uncertainty arising from the use of traffic model outputs, standardised emission factors and temporal interpolation:

- Traffic models provide estimates of flow, speed and fleet composition rather than actual conditions; therefore, any uncertainty in these outputs propagates directly into emissions estimates.
- Emissions factors are influenced by a range of variables including fleet composition and age, vehicle characteristics (such as size or weight), emissions standards, fuel type, ambient conditions and driving behaviour. As such, emissions factors for any given speed do not fully capture the variability associated with real-world operating conditions.
- The interpolation of estimated emissions between modelled years (using a linear basis) assumes smooth changes over time, which may not fully reflect real-world trends.

Despite these limitations, the combination of using modelled traffic data and the latest national emissions factors reflect established best practice for estimating road user carbon emissions.