
Net Zero Highways

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Introduction

Transport matters. The movement of people and goods around the country enables growth, well-being and prosperity.

Our highways are the beating heart of the country's transport system, with 9 out of 10 journeys made by road today. As we look to the future, while there are many uncertainties, it is clear the vast majority of journeys will continue to be made by road.

That is why it is vital we decarbonise our highway network. The Highways Sector Council, which brings together the public and private sector bodies responsible for our nation's highways, knows that there is no more important challenge than Net Zero.

Highways have the opportunity to decarbonise rapidly. This means that roads can meet the twin goals of continuing to act as the lifeblood of our communities and businesses and meeting the expectations of Government and society on climate change. The sector is already doing positive, challenging and tangible things to tackle carbon - these form the foundation for further transformative change required to go yet further.

The Highways Sector Council's purpose is "to bring together industry and government to transform the highways sector". This document outlines how we are doing just that and how the sector is coming together to deliver action at unprecedented scale and at pace to meet the challenge of Net Zero.

LEON DANIELS

Highways Sector Council Chair



Why highways matter

90%

OF ALL PASSENGER TRIPS AND 80% OF ALL FREIGHT ARE BY ROAD

HIGHWAYS ARE ESSENTIAL FOR BUSES, COACHES, CYCLING AND WALKING

INDUSTRIES DEPENDENT ON THE 4,300 MILE NETWORK OF ENGLAND'S MOTORWAYS AND MAJOR A-ROADS CONTRIBUTE

£409BN

IN GROSS VALUE ADDED TO THE ECONOMY AND THIS IS FORECAST TO GROW

97%

OF ALL TRIPS IN THE NORTH ARE BY ROAD

REDUCING CONGESTION TO AND FROM AIRPORTS BY 5% COULD ADD

£1.9BN

TO THE UK ECONOMY

IN 2020 ROAD FREIGHT CARRIED

77% OF 176BN TONNE-KMS

FREIGHT COMPARED WITH 9% CARRIED BY RAIL FREIGHT

68%

OF ALL COMMUTING TRIPS ACROSS THE UK ARE BY CAR. IN ENGLAND, OUTSIDE LONDON, THIS IS AT LEAST 75% OF ALL COMMUTING TRIPS

MORE THAN

6/10

TOURISM DAY TRIPS ARE MADE BY CAR. AND NEARLY 8 OUT OF 10 HOLIDAY VISITS ARE MADE BY CAR

PEOPLE IN RURAL AREAS RELY MUCH MORE ON ROADS, WITH

72%

OF ALL RURAL TRIPS IN 2020 MADE BY CAR COMPARED TO 50% IN URBAN AREAS

Zero Carbon Highways:

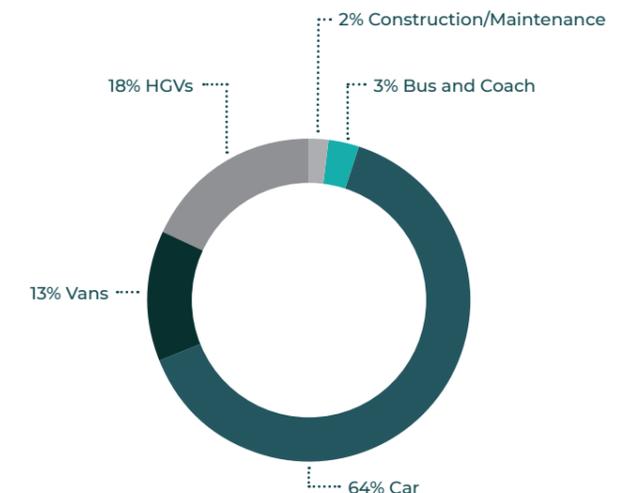
Leading the decarbonisation of transport

The challenge

The UK's economy is changing fast to a net zero future. Already, the UK has cut greenhouse gases by half since 1990 and the Government set out for the first time its overall Net Zero strategy ahead of 2021's COP 26. Roads are essential to everyday life. They are, and will continue to be, the lifeblood of our communities and businesses. All of us in the Highways Sector are committed to reducing the carbon from roads. We have made a good start, and we recognise we need to continue to transform how we deliver to take the carbon out of road construction, road maintenance and the vehicles that run on them. To deliver a net zero economy, our roads must be net zero too.

The scale of the challenge is not to be underestimated. Surface transport is currently the UK's biggest emitter of carbon and road transport is the biggest contributor to that, emitting around 112 million tonnes of CO₂e each year in England. Approximately 98% of this is related to 'tailpipe' emissions, with 2% related to maintenance and construction activities.

The Highways sector will support Government in transforming the country's vehicle fleet to electric and other net zero carbon technologies. But what we can, and will, lead directly as a sector is the decarbonisation of road construction and maintenance.



The progress made so far demonstrates the commitment of all in the Highways sector. We have adapted how we construct and maintain roads whilst delivering and meeting the needs of the public who depend on a reliable road network. Our opportunity and challenge now is to apply zero-carbon approaches to our whole approach to roads: from the earliest stages of planning, considering all options in response to transport needs, designing from a zero-carbon mindset, buying cutting-edge materials and using the lowest carbon plant and machinery as well as supporting and collaborating with other industries who are researching, developing and manufacturing the next generation of zero carbon products.

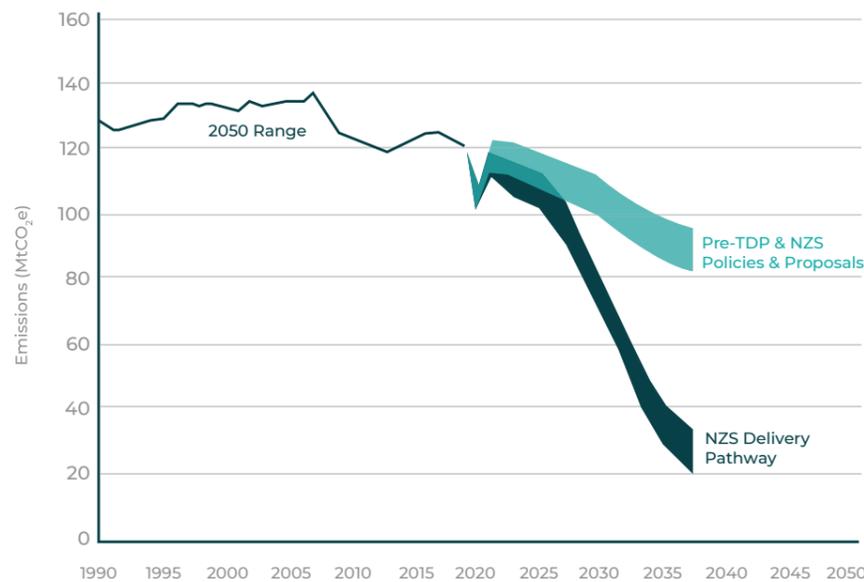
Roads will decarbonise quickly

While the challenge is great, the highways sector is able to transform at the pace needed to meet the country's net zero commitments. The Government's Transport Decarbonisation Plan (TDP) and Industrial Decarbonisation Strategy set out clear priorities for transport and construction to eliminate these emissions over the coming thirty years. When combined with the plans of HSC's members, fast action is being taken enabling a rapid rate of change.

The TDP commits to a series of statutory targets to rapidly transition vehicles from petrol/diesel to electric or hydrogen:

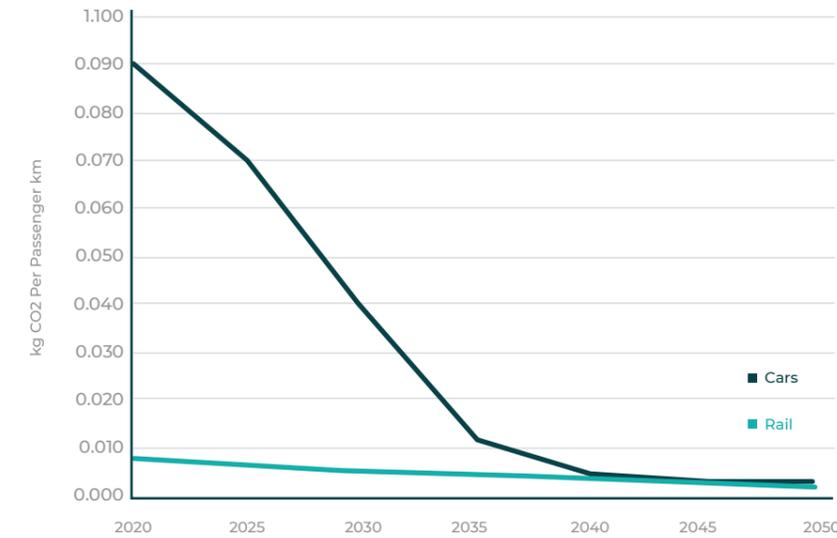
2024	A zero-emission mandate for new car and van sales
2030	Half of journeys in towns and cities to be cycled or walked
2030	Sales of new petrol and diesel cars and vans to be phased out
2035	All new cars and vans fully zero emission
2040	Sale of new diesel HGVs to be phased out.

This enables dramatic carbon reductions in the coming decade:



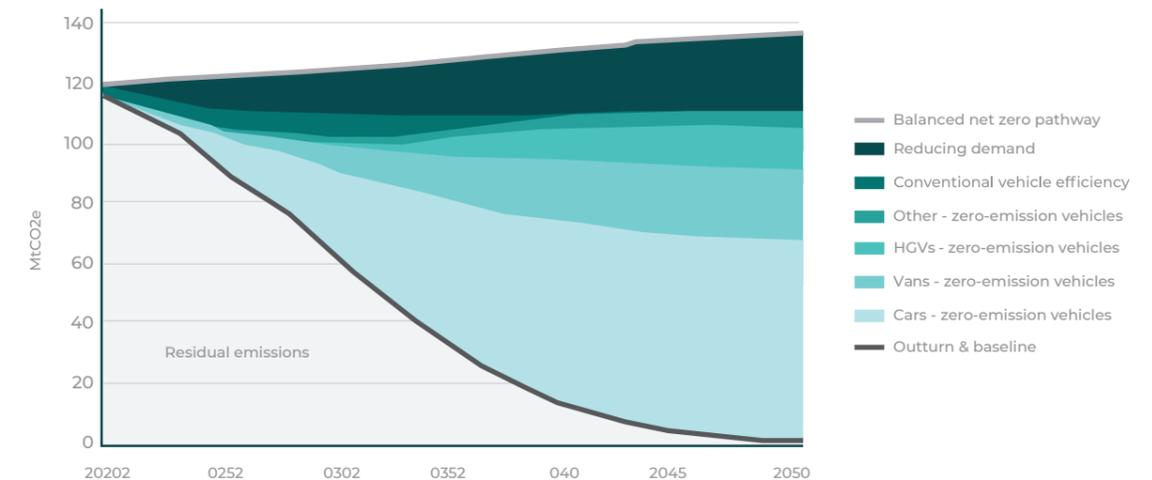
Climate Change Committee recommends that greenhouse gas emissions from road transport should fall by 60% between today and 2037 (Source CCC 6th Carbon Budget)

Passenger emissions: Trains Vs Roads:



Phase down of petrol and diesel vehicles means the carbon intensity of car travel approaches that of rail by the mid-2030s (Source National Highways research based on DfT strategies)

The Climate Change Committee (CCC) has set the trajectory of reducing Surface Transport emissions from 120MtCO2e per annum in 2020 to 32MtCO2e per annum in 2035, i.e. a 70% reduction.



The HSC's ambition is that the sector matches, and in many areas exceeds, that rate of reduction.

The CCC's balanced pathway sees the uptake of zero emission road vehicles accounting for the vast majority (c.80%) of decarbonisation, with modal shift also having an important role (c.20%).

Driving change

Given the importance of zero emission vehicle uptake, rapid and ambitious action to deliver zero carbon mobility for all modes is essential. The highways sector will support this through working with the energy sector to provide the charging infrastructure road users will need. We recognise we can't do this alone and there are significant challenges for providers of power to connect to all transport networks.

Policies which encourage working from home, active travel, car-sharing and switching to non-car modes, can help control the growth in road trips, particularly for shorter trips and in urban areas, and this is a focus of many Highways Sector Council members. Highways, not just roads, are essential for walking and

cycling, buses and coaches, logistics and mobility for society and our members are already undertaking a wide range of projects that encourage these modes.

There are however constraints in how many trips can be reduced or re-moded, in particular for longer journeys. For example, the CCC's recommendation to expand rail freight by 20% takes less than 2% of HGVs off our highways. Overall, even with ambitious modal shift policies, the CCC estimates a 5% increase in road traffic by 2030 and a 15% increase by 2050. This is why we are supportive of an integrated transport system that gives people the flexibility to use different modes to meet different needs - all of which will increasingly be low and zero emission.

Construction and Maintenance Decarbonisation

As well as the rapid decarbonisation of vehicles the sector is focused on decarbonising road construction and maintenance. Low-carbon alternatives to concrete, steel and asphalt are already available and new products continue to be developed. As a sector we want to invest in these and help make the case for them to be used in more and more situations. And we are increasingly reducing HGV and heavy plant emissions either by changing construction

practices to remove lorry movements altogether or by using low/zero carbon plant.

We believe that these approaches will enable road maintenance and construction activities to be about 50% lower in carbon by 2030 than they are today - with carbon neutral construction a realistic ambition at this stage. We share the ambition with the CCC for construction to be net zero well before 2050, and are working with our members with the aim of delivering this goal by the early 2040s.



Decarbonisation across the Highways Sector

1. Zero Carbon Strategic Highways

National Highways' Net Zero Plan sets out an ambitious approach to decarbonising the Strategic Road Network, which consists of 4,300 miles of motorways and major A

roads in England. This plan commits to net zero for National Highways' own emissions in 2030, construction and maintenance by 2040, and road users by 2050.



Case Study: Project Rapid – EV charging on the Strategic Road Network

The rapid charging fund (RCF) is a £950 million fund to future-proof electrical capacity at motorway and major A road service areas to prepare the network for 100% zero emissions vehicles (ZEV) uptake. National Highways are working to support the Office for Zero Emission vehicles as it seeks to radically expand the strategic charging network, with the aim that:

- ▶ By 2023, there will be at least 6 high-powered, open-access chargepoints (150-350 kW capable) at motorway service areas in England
- ▶ by 2030, we expect around 2,500 high-powered, open-access chargepoints across England's motorways and major A roads
- ▶ by 2035, we expect around 6,000 high-powered, open-access chargepoints across England's motorways and major A roads

2. Zero Carbon Local Highways

Over 300 local authorities have declared a climate emergency, with many committing to carbon neutral or net zero direct operations on an ambitious timescale and also to leading the delivery of net zero regions. ADEPT and FHRG (Future Highways Research Group) are continuing their work, in collaboration with private sector partners, to bring clarity and consistency in managing Scope 1, 2 and 3 emissions.

Helping local communities travel in a zero-carbon way is key and this will largely be delivered through strong and updated local

transport plans which support zero carbon, public transport and active travel. There is great opportunity for local authorities and transport planners to work together, to share good practice and to accelerate the development of these next generation Plans – with net zero at their heart.

Many local highways authorities are also beginning to measure the embodied greenhouse gases in their maintenance and construction activities and to place requirements in their contracts with the roads maintenance sector.

Case Study: Cheshire East Council – Decarbonising highways operations

Cheshire East Highways are refurbishing all their Integrated Services Highways Depots in their move to be carbon-neutral in their operations by 2025. They have installed solar panels on depot building roofs, reducing electricity from grid by c.75% whilst providing surplus power back to the grid in summer months.

Other innovations implemented include:

- ▶ Carbon neutral sites including green site offices and solar generators to power plant and equipment
- ▶ Growing their EV fleet (mainly vans/cars at present)
- ▶ 95% of CEC street lights and traffic signals now LED
- ▶ Use of warm asphalt for surfacing, requiring less heat and energy to produce
- ▶ Use of a cold mix for 50% of potholes, requiring less energy and resulting in less waste
- ▶ Supporting other parts of the council, including environmental services, to grow a fleet of hybrid hydrogen refuse lorries

3. Zero Carbon Highways Industry

While highway maintenance and construction is a much smaller source of greenhouse gas emissions compared to road users, the highways sector is an anchor customer for the UK construction sector. Together we have the opportunity to share best practice and innovation. To innovate so we make the most of the roads we have today. To design schemes which use low carbon materials. And to give the UK

construction sector the confidence and the challenge to innovate to deliver zero carbon materials, ways of working and transport. Together, this will support the goals of the Industrial Decarbonisation Plan, will set UK construction apart to grow and export services, and will help the delivery of the science based commitments with which our sector is aligned.



We are changing the way we work as a sector

The ambition is there in the sector to change. Increasingly our members are adopting PAS 2080: Carbon Management in Infrastructure¹, which offers a systematic way for managing whole life carbon. PAS 2080¹ will be the cornerstone from which the industry can build and accelerate improvement and is a fundamental enabler to minimising the whole life carbon footprint of highways.

There are also increasing opportunities to drive change. Low-carbon alternatives to concrete, steel and asphalt are already available and new products continue to be developed. For example, the £1.5bn A14 enhancement scheme used cemfree concrete in its kerbs and drainage, which generates 80% less carbon than using Portland cement. As a sector we want to invest in these and help make the safety case for them to be used in more and more

situations. Emissions from HGVs and heavy plant can be significantly reduced either by changing construction practices to remove lorry movements altogether or by using low and zero carbon plant. For example, recent enhancement schemes on the A14, M20 and M4 have used hybrid electric drive excavators, with the use of green machinery saving fuel and reducing carbon.

We expect road maintenance and construction activities to be about 50% lower in carbon by 2030 than they are today. We share the ambition with CCC for construction to be net zero by the early 2040s.

Case Study: A590 – The first carbon neutral road pavement construction

National Highways and their supply chain completed the UK's first carbon neutral road pavement construction – an £8m carriageway resurfacing and reconstruction in Cumbria.

In total the project reduced carbon by up to 43% compared to traditional solutions and saved almost £3m. To do this the organisations took the following actions:

- ▶ Early collaboration between the construction team to share ideas and to model carbon potential savings
- ▶ Re-using the road planings in the new road surface. This reduced new material use and truck movements
- ▶ Using solar powered generators to provide energy for site lighting, signage, CCTV and catering facilities. Electric vehicles were also used on the scheme

The Highways Sector Council's role in supporting a Zero Carbon Highways Industry

As a sector wide body with representation from highway authorities/client bodies, professional institutions and private sector designers and contractors, HSC is uniquely placed to mobilise the collaborative effort necessary to drive down emissions in the Highways Sector as a whole.

We will align our actions to achievement of the CCC's balanced pathway to Net Zero and the government's Net Zero Strategy and Transport Decarbonisation Plan, whilst also supporting all highway authorities in meeting their respective decarbonisation aims

Given the urgency of the Net Zero challenge HSC will initially focus this effort on reducing those GHG producing activities that contribute the most to the whole life emissions of a highway asset - Road User and Capital Carbon emissions.

Road user emissions

HSC will facilitate cross-sectoral collaboration to help public and private organisations deliver their respective carbon commitments. Leveraging its members and partners HSC will help share best practice and expertise,

for example in EV infrastructure and modal optimisation, and will lead industry engagement with DfT in delivering Net Zero emissions in surface transport.

Capital carbon [embodied in new or renewed highways]

HSC will promote consistency across the industry in its approach to reducing capital carbon. PAS 2080: Carbon Management in Infrastructure¹ offers a systematic way for managing whole life carbon that HSC believes can be the cornerstone from which the industry can build and accelerate improvement. Aligned to Government's Construction Playbook, National Highways' Net Zero Highways plan and the Construction Leadership Council's Carbon Reduction Code, HSC will leverage its sector wide membership to accelerate the scalable adoption of PAS 2080 as a fundamental enabler to minimising the whole life carbon footprint of highways.



Our approach

We are addressing these commitments by:

- ▶ Leading Working Groups on key focus areas of: PAS 2080¹ adoption, robust scheme appraisal, and construction and maintenance emissions from cement, steel and diesel
- ▶ Drafting in appropriate 'round table' expertise from the sector to support our Working Groups
- ▶ Connecting with existing carbon reduction initiatives/groups, such as ADEPT Live Labs 2 and Future Highways Research Group, to ensure alignment and added value
- ▶ Facilitating two-way communication between DfT and the sector to both disseminate progress and enable DfT and the sector to respond faster to matters arising on the path to Net Zero



How we can make a difference

The Highways Sector has made good progress to reduce carbon while delivering for the customers and users of the road network. Our opportunity now is to continue to transform the sector and put zero-carbon at the heart of the way we construct, maintain and operate our roads. We will increasingly plan, develop options, design, build and operate with a zero-carbon mindset. There is no shortage of passion and commitment within the sector. The Highways Sector Council will help coordinate the sector, facilitate the sharing of ideas and help drive change at pace and scale so the sector successfully meets the Net Zero challenge.

¹ An updated PAS 2080:22 is due to be published by BSI later in 2022.

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