Telford & Wrekin Co-operative Council

Protect, care and invest to create a better borough

TravelTelford

Telford & Wrekin Transport Plan

Carbon Baseline

2027-2041

Draft for consultation

1. Executive Summary

International, national and local action has been taken to respond to the Climate Emergency, aiming to limit the scale of the social, economic and environmental impacts of climate change caused by greenhouse gas (GHG) emissions. At the local level, **Telford & Wrekin Council declared a climate emergency in July 2019** and committed to carbon neutrality in the council's operations and activities by 2030; and to engage with stakeholders to support the aspiration for the borough to be carbon neutral by 2030.

Transport measures have an important role to play in reducing GHG emissions as **the transport sector generates more emissions than any other sector nationally**. It is also the most emitting sector in Telford and Wrekin, accounting for nearly 35% of the borough's GHG emissions in 2023.

There are a number of uncertainties in forecasts of transport emissions, including in relation to future travel demand, vehicle purchase trends and rates of decarbonisation of electricity supply. However, baseline projections indicate that, even with projected zero emission vehicle (ZEV) uptake, **transport emissions in Telford and Wrekin and nationally are projected to exceed decarbonisation pathways to 2050**, as illustrated in Figure 1.

The green lines in Figure 1 show the **decarbonisation pathways identified by the Climate Change Committee (CCC) and in the Government's Net Zero Strategy (NZS)** to reflect the rate of transport sector decarbonisation needed to meet the 2050 net zero target and the intermediate 5-year carbon budgets that have been determined to limit the cumulative emissions to 2050, the main driver of climate change.

The blue lines in Figure 1 show baseline transport emissions projections from the Midlands Connect Emissions Baseline Dashboard for Telford and Wrekin, each reflecting different views of ZEV uptake. The dark dotted line (Localised ZEV Uptake scenario) is considered the most realistic reflection of current and proposed national action to support ZEV uptake. The lowest light dotted blue line reflects an illustrative, ambitious view of accelerated ZEV uptake, implying considerably more national action to support uptake than is currently proposed.

In all scenarios there is a **significant emissions gap between projected emissions and the decarbonisation pathways meaning that there will be an 'overshoot' of carbon budgets**. Decarbonisation progress has been slow in recent years, increasing the scale of the challenge and the risk of overshoot.

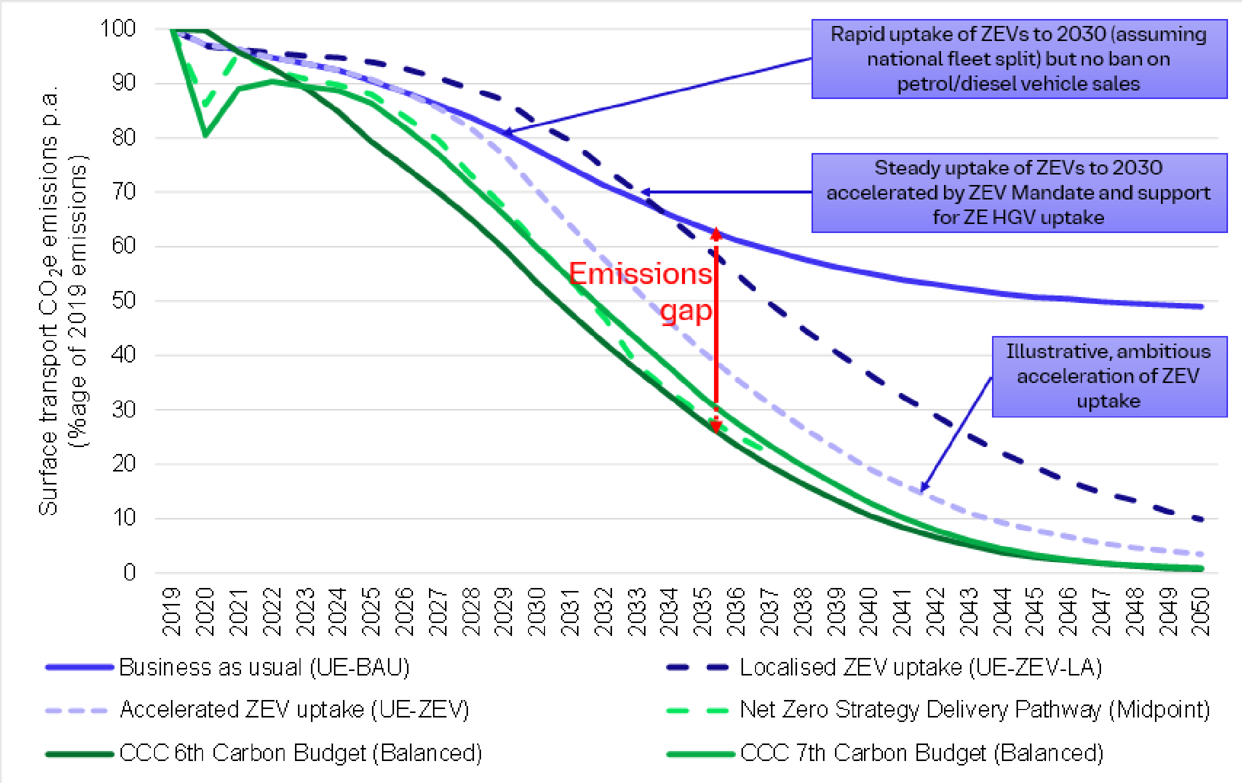

Figure 1: Telford and Wrekin surface transport baseline emissions and decarbonisation pathways[1]

Comparing the Localised ZEV Uptake scenario with the decarbonisation pathways indicates that **by 2030, closing the emissions gap would require an emissions reduction of approximately 30% relative to the projected baseline**. By 2035 the reduction would be approximately 50%, increasing to over 70% in the 2040s. If the emissions gap is to be closed and the pathways met, **significant action will be needed to reduce transport emissions** in the next five and ten-year periods. The ambitious accelerated ZEV uptake scenario shows that **ZEVs will play an important role but will not be enough alone; wider decarbonisation action to reduce emissions by reducing vehicle kilometres travelled will also be needed**.

Considering cross-sector decarbonisation pathways, it will be **important to consider the wider lifecycle emissions impacts of transport decisions** as new transport infrastructure and fleet can generate significant capital carbon impacting on other emissions sectors (primarily industry).

The emissions patterns and challenges seen in Telford and Wrekin are consistent with patterns seen in other authorities across the country, highlighting the scale of the challenge at the national level. The government has identified that **local action has a key role to play in transport decarbonisation**. The recent statutory guidance on Local Transport Plans (LTPs) states that **local authorities must use the DfT's Quantified Carbon Guidance (QCG) to assess and understand the impact of proposed Local Transport Plan measures** and report on whole lifecycle transport carbon impacts as an indicator in the DfT's LTP outcome framework.

[1] Further details on the pathways and baseline projections are provided in Baseline and projected transport sector emissions in Telford and Wrekin (page 18).

This report represents the evidence, analysis and baseline creation step of the QCG LTP carbon analysis process. Its aim is to provide an understanding of the scale of the decarbonisation challenge (through the emissions gap analysis described above) and of the sources of transport-related emissions to **inform decisions on the types of policies and measures to include within the Telford & Wrekin Transport Plan (TWTP)**.

Data from the Midlands Connect Emissions Baseline Dashboard, Telford Strategic Transport Model, National Travel Survey and CREDS place based carbon calculator provide a number of **insights into the source and geographical distribution of emissions in Telford and Wrekin that help to identify potential areas of focus for decarbonisation measures**, as summarised in Figure 2.

	Emissions by source		Emissions by movement type
	• Cars ~ 59% emissions within T&W • Light Goods Vehicles ~ 17% • Heavy Goods Vehicles ~ 19% • Public transport ~ 5%		• Through trips ~ 35% road emissions in T&W • Inbound/outbound trips ~ 40% • Internal trips ~ 30%
	• Local Road Network (LRN) ~ 45% emissions within T&W • Major Road Network (MRN) ~ 20% • Strategic Road Network (SRN) ~ 35%		• Trips to/from Telford 'Urban large' area (particularly central T&W) > 80% road emissions in T&W
	• Trips > 10 miles long: > 65% road emissions within T&W (all vehicle types) • Car trips < 5 miles: < 15% emissions (but >55% of trips) (reflecting national patterns) • Business travel ~ 50% (all vehicle types, including goods vehicles) • Leisure travel ~ 35% car emissions		• Car trips within T&W ~ 30% emissions from car trips to/from/within T&W • Car trips to/from Shropshire ~ 30% emissions from car trips to/from/within T&W • Car trips to/from wider West Midlands ~ 20% emissions from car trips to/from/within T&W
	• More rural and prosperous population groups can generate more than double the carbon emissions from car use than more urban, lower income groups		• Dispersed emissions from rural areas, less busy movements and on more minor roads sum to a significant proportion of the total

Figure 2: The sources and distribution of transport emissions in Telford and Wrekin

A review of Whole Lifecycle Carbon (WLC) highlights that **infrastructure emissions account for only a small proportion of WLC transport related emissions** in Telford and Wrekin on an annual basis. As the transport system is already in place, emissions are generated only by incremental increases in the network (through building new schemes) or the relatively minor impacts of maintenance and repair works (equating to <0.5% of annual user emissions).

However, when considering the **lifecycle** of an individual transport scheme, the **infrastructure emissions are significant** and will become increasingly important as the proportion of ZEVs increases in the fleet. **It can take many years for user savings from an infrastructure scheme to deliver sufficient mode shift to 'payback' the upfront capital emissions**. For road schemes. the capital emissions are equivalent to a number of years' worth of additional user emissions generated, adding to the net increase caused.

Key considerations for the TWTP

The baseline evidence and analysis in the report suggests a number of key considerations to inform the TWTP as follows:

- **Rapid and significant transport decarbonisation will be needed if Telford and Wrekin is to meet decarbonisation targets**. Transport accounted for nearly 35% of GHG emissions in borough in 2023 and there is a substantial 'emissions gap' between projected emissions and government and CCC decarbonisation pathways in Telford and Wrekin, as there is nationally.
- **Diverse decarbonisation measures would be needed to close the emissions gap** which would involve reducing emissions from the baseline by approximately 30% in 2030, 50% in 2035 and over 70% in the 2040s.
    - Action to accelerate ZEV uptake beyond the levels projected in response to current and proposed measures would play an important role but would not be enough alone.
    - Additional action would need to reduce emissions by reducing the number of vehicle kilometres travelled.
- **Decarbonisation measures developed would need to take account of Telford and Wrekin's characteristics and the distribution of emissions between sources.** Particularly the characteristics and influences summarised in Figure 2.
- **A wide range of decarbonisation measures would be needed to respond to the range of emissions sources**. For instance, active travel measures are most suited to relatively short urban trips and public transport measures for mid/long distance movements with significant trip numbers. More dispersed trips may be better addressed by shared transport, or alternative forms of accessibility (such as online services or localisation).
- Different stakeholders have greatest potential to influence different elements of emissions:
    - Telford & Wrekin Council and local stakeholders are likely to have most scope to influence emissions from internal car trips because both ends of the journey are within the borough. Influence on inbound / outbound car trips should also be possible, although it will be important to work with neighbouring authorities and other stakeholders for cross-border trips, recognising the reciprocal ability to influence emissions within each other's boundaries.
    - Through trips by all vehicle types will be more influenced by National Highways and other authorities.
    - Telford & Wrekin Council and local stakeholder influence over freight trips will be limited even for trips starting or ending in the borough, which are largely influenced by commercial decision making, particularly those to and from distribution centres where trips are determined by decisions made by companies located elsewhere.
- **Whole life cycle emissions impacts must be considered in transport decision making**. The infrastructure carbon from new schemes is significant and it can take many years for user savings to 'payback' the upfront capital emissions of construction (and ongoing operational carbon) and so the balance between emissions by lifecycle stages needs to inform decisions.

2. Introduction

2.1 Local Transport Plan

Telford & Wrekin Council is preparing a new Local Transport Plan (LTP), the Telford & Wrekin Transport Plan (TWTP), to be adopted in early 2027. The TWTP will provide a long-term strategic framework for transport, focusing on establishing a clear vision and set of ambitions for the 2027–2041 period, identifying the policies needed to deliver that vision, and setting out the priority schemes within the 2027–2030 Transport Delivery Plan.

Development of the TWTP will be informed by the recently published DfT LTP guidance[2] and the associated Local Transport Quantifiable Carbon Guidance (QCG),[3] which sets expectations for transport carbon assessment.

AtkinsRéalis is supporting Telford & Wrekin Council in the technical, strategic and engagement activities required to prepare the TWTP. This builds on previous work undertaken for the council, including initial carbon baselining (2023) and place type analysis (2024).

2.2 Purpose of this report

This report is intended to support the development of the TWTP by providing an **understanding of the scale and source of the transport decarbonisation challenge in Telford and Wrekin**. It follows the guidance for the first step in the carbon analysis process for local transport strategies identified in the DfT's QCG,[4] as described further in *DfT guidance (page 15 of this report)*.

To provide context for TWTP development, the report sets out current levels of transport sector emissions and provides estimates of projected emissions levels in scenarios with different views on the rate of future uptake of zero emission vehicles (ZEVs). The projected emissions are compared against transport decarbonisation pathways which have been identified by the Government and the Climate Change Committee (CCC)[5] to show the rate at which the transport sector needs to decarbonise to contribute to national decarbonisation targets. **The 'emissions gap' between projected emissions and the decarbonisation pathways provides a clear indication of the scale of emission reductions required every year until 2050** (and beyond) if Telford and Wrekin's transport sector is to make a proportionate contribution to national carbon reduction targets.

The estimate of the emissions gap and the scale of action that would be needed to close it provides context for the process of identifying measures for the TWTP. This is supplemented by an **overview of the sources of transport emissions in Telford and Wrekin** (by vehicle type, trip type, population segment and location), to help to understand where action to close the gap would be most effectively focussed. This analysis will inform a subsequent report to review the potential emissions impact of the TWTP policies and measures.

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[2] DfT (2026) Statutory Guidance: Local Transport Plans. Available at: Local transport plans - GOV.UK
[3] DfT (2025) Local Transport Quantifiable Carbon Guidance. Available at: Local Transport Quantifiable Carbon Guidance
[4] ibid
[5] Climate Change Committee (CCC) is an independent, statutory body established under the Climate Change Act 2008 to advise the UK and devolved governments on emissions targets and to report to Parliament on progress made in reducing GHG emissions and preparing for and adapting to the impacts of climate change.

The importance of taking a **whole life carbon perspective** for transport decision making is also highlighted with high level analysis to estimate the annual scale of emissions from highways maintenance in Telford and Wrekin and illustrations of the balance between user carbon savings and capital carbon for new schemes involving new infrastructure.

Following this introduction, the remainder of the report is structured as follows:

- *Context (page 7)* provides context on the climate emergency, the policy response and the role of the transport sector in meeting decarbonisation targets.
- *Baseline and projected transport sector emissions in Telford and Wrekin (page 18)* provides a summary of current and projected transport emissions in Telford and Wrekin and estimates the size of the emissions gap with decarbonisation pathways.
- *Transport emissions by source (page 27)* provides a breakdown of surface transport emissions in Telford and Wrekin by source, considering characteristics such as vehicle type, road type, trip purpose and population segment.
- *Geographical distribution of emissions (page 39)* provides an analysis of the geographical distribution of transport emissions, including emissions by trip type and area type and hotspot origins and destinations of car trips.
- *Whole life cycle emissions (page 55)* discusses whole lifecycle transport carbon emissions, including emissions from the maintenance of existing infrastructure and constructing new schemes.
- *Summary considerations for the TWTP (page 62)* draws on the previous sections to identify key considerations for the TWTP.

These sections are supplemented by three appendices:

- Appendix A. Uncertainties influencing emissions estimates (page 64) provides more details on sources of uncertainty in transport emissions projections (described in *Baseline and projected transport sector emissions in Telford and Wrekin (page 18)*).
- *Appendix B*. Sector system *(page 72)* shows the Telford Strategic Transport Model sector system used for analysis on carbon intensive movements presented in *Geographical distribution of emissions (page 39)*.
- *Appendix C. Key Telford and Wrekin based car movements (page 74)* provides further detail on the sector-based carbon intensive movement analysis presented in *Geographical distribution of emissions (page 39)*.

3. Context

Key points from Context section

International, national and local action has been taken to respond to the Climate Emergency, aiming to limit the scale of the social, economic and environmental impacts of climate change caused by greenhouse gas (GHG) emissions. At the local level, Telford & Wrekin Council declared a climate emergency in July 2019 and committed to carbon neutrality in the council's operations and activities by 2030; and to engaging with stakeholders to support the **aspiration for the borough to be carbon neutral by 2030.**

The transport sector generates more emissions than any other sector nationally and, even with rapid zero emission vehicle (ZEV) uptake, future transport emissions are projected to exceed the decarbonisation pathways to 2050 identified by the Climate Change Committee (CCC) and Government. The pathways reflect the rate of transport sector decarbonisation estimated to be needed to meet the 2050 net zero target and the intermediate 5-year carbon budgets which have been determined to limit the cumulative emissions to 2050, the main driver of climate change. **Significant decarbonisation action would be required to close the emissions gap between projected emissions and the pathways and avoid overshoot of carbon budgets.**

The INFUZE research project's recent review of national surface transport decarbonisation progress and plans has highlighted that **decarbonisation progress has been limited over recent years** and government transport decarbonisation pathways have reduced in ambition. The most recent pathway, set out in the Carbon Budget Delivery and Growth Plan will overshoot the transport budget identified in the CCC's Seventh Carbon Budget.

Considering cross-sector decarbonisation pathways, it will also be **important to consider the wider lifecycle emissions** impacts of transport decisions as new infrastructure and fleet can generate significant capital carbon impacting on other emissions sectors (particularly the industrial sector).

Local action has a key role to play in accelerating transport decarbonisation to close the emissions gap and limit overshoot. DfT's recent statutory guidance on LTPs states that local authorities must use the **DfT's Quantified Carbon Guidance** (QCG) to assess and understand the impact of proposed TWTP measures and to report on whole lifecycle transport carbon impacts which has been identified as an indicator in the DfT's **LTP outcome framework**.

This report represents the **evidence, analysis and baseline creation step** of the QCG LTP carbon analysis process. It aims to show the scale of the decarbonisation challenge and the sources of transport-related emissions to inform decisions on the types of policies and measures to include within the TWTP.

3.1 The climate emergency

Global action is needed to reduce emissions of greenhouse gases (GHGs), including carbon dioxide (CO_2) (see box), to avoid the most damaging projected outcomes of climate change caused by global warming. The Intergovernmental Panel on Climate

Change (IPCC) has highlighted the scale of the challenge and threat over many years.[6] Most recently their 2023 Sixth Assessment Report, Synthesis Report,[7] highlighted that the risks and impacts of exceeding a 1.5°C temperature increase (above pre-industrial temperatures) are worse than was previously thought.

Carbon, CO_2, CO_2e and greenhouse gases.

The terms carbon, carbon dioxide, CO_2, CO_2e and greenhouse gases (GHGs) are often used interchangeably.

Climate change is driven by a range of GHGs including carbon dioxide (CO_2). CO_2 is the dominant GHG, particularly for the transport sector (accounting for over 99% of transport GHG emissions). Other GHGs can be expressed in terms of the amount of CO_2 that would cause the same level of warming, in which case totals are expressed as CO_2 equivalent or CO_2e.

The term carbon emissions is often used as shorthand for CO_2 and CO_2e emissions.

Global warming is now being clearly seen. Globally, 2023, 2024 and 2025 were the hottest years on record.[8] In the UK, the three hottest years since records began in 1884 were 2022, 2023 and 2025.[9]

By 2023, global warming above pre-industrial levels was already estimated to have reached 1.3°C. Even if all countries' nationally determined commitments and longer-term pledges for carbon reduction are met, projections by Climate Action Tracker indicate that the world is **currently set for an estimated average increase in global temperature of over 2°C** (above pre-industrial levels) by 2100.[10]

The IPCC reports that global warming and associated climate change are already causing widespread global impacts, including more frequent and intense extreme weather events, rising sea levels, ecosystem damage, biodiversity loss, and increasing risks to human health, food security, water resources, and infrastructure. These impacts will intensify as climate change increases.[11] Warming of over 1.5°C will cause significant, irreversible impacts for the global climate, resulting in wide-ranging social, environmental and economic impacts.

Within the UK, temperature rises are likely to have diverse impacts. For instance, the Climate Change Committee's (CCC) most recent risk assessment report (2021)[12] identifies that flooding risk is expected to increase considerably. Average winter precipitation will increase, in terms of both the intensity of the rainfall and the number of wet days.

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[6] The IPCC (2018) Special Report on Global Warming of 1.5°C (Available at Global Warming of 1.5 ºC —) stressed the serious consequences of any temperature increase more than 1.5°C above pre-industrial levels. The message on the severity of the risk was then reinforced by a 2021 report on the physical science of climate change. Available at Climate Change 2021: The Physical Science Basis | Climate Change 2021: The Physical Science Basis

[7] IPCC (2023) Assessment Report 6 Synthesis Report. Available at AR6 Synthesis Report: Climate Change 2023 — IPCC

[8] 2025 continues series of world's three warmest years - Met Office

[9] 2025 is double-record breaker: UK's warmest and sunniest year on record - Met Office

[10] Little change in warming outlook for four years; new 2035 climate targets make no difference | Climate Action Tracker

[11] IPCC (2023) Synthesis Report of the IPCC Sixth Assessment Report (AR6) Summary for Policymakers. Available at: Climate change 2023 :

[12] CCC (2021) Independent Assessment of UK Climate Risk. Available at: Independent Assessment of UK Climate Risk - Climate Change Committee (theccc.org.uk). The 2021 report was the third risk assessment (CCRA3), CCRA4 is due to be published in 2026.

Summers are expected to get drier, but the intensity of summer precipitation (when it occurs) will increase. More properties will face the risk of flooding, and areas already at risk will face more frequent flooding. Current flood defences will be subject to additional pressure which will increase risk of further flooding events.

3.2 Policy response to the climate emergency

International and national response

The Paris Agreement in December 2015 was the first legally binding global climate deal, reflecting recognition of the urgency of responding to the climate emergency. The agreement set out a global action plan to avoid dangerous climate change by 'holding the global average temperature increase to well below 2°C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels' by reducing GHG emissions. The IPCC's follow up report identified that a global reduction in GHG emissions of 45% was needed by 2030. Each country that is a party to the agreement continues to meet at Conference of Party (COP) meetings for the agreement and has to identify Nationally Determined Contributions (NDCs) (self-defined plans to reduce GHGs and adapt to climate change). The NDCs need to be updated with increased ambition every five years.

Nationally, the UK Government introduced a legally binding target for the UK to reduce GHG emissions by 80% by 2050 relative to 1990 in the Climate Change Act 2008. In June 2019, the **UK's target was updated to reaching net zero GHG emissions by 2050**. This reflected the CCC's view on the UK's fair contribution to the emissions reduction required to limit global warming and therefore meet the Paris Agreement objectives.

The **driving influence on the level of climate change experienced by 2050 will be the total cumulative level of emissions between now and then**, rather than the level of annual emissions in 2050. GHG emissions stay in the atmosphere for decades causing warming once released and therefore rapid reductions in GHG emissions to limit cumulative emissions are needed to limit climate change, rather than 'just-in-time' action to meet the 2050 target.

UK Decarbonisation Targets / Commitments

- Net Zero GHG emissions by 2050.
- The fifth carbon budget (to 2032) involves reducing all sector emissions by 57% by 2030 compared to 1990 levels.
- The sixth carbon budget (to 2037) was made legally binding in June 2021 and involves reducing all sector emissions by 78% by 2035 compared to 1990 levels. The seventh carbon budget became law in June 2026, committing to an 87% reduction in all sector emissions by 2040 compared to 1990 levels
- The UK'S NDCs are to reduce GHG by at least 68% compared to 1990 by 2030 and 81% by 2035 (excluding shipping and aviation).

Recognising that limiting total cumulative emissions before 2050 is more important than meeting the 2050 net zero target itself, the **CCC identify five-year carbon budgets**. The budgets reflect the upper level of emissions that they estimate can be emitted in each five-year interval if the UK is to make a fair contribution to decarbonisation. The budgets are interim steps setting out the carbon pathway to 2050 that is consistent with decarbonisation commitments. The UK government has set the seven budgets (covering the period to 2042) as legal commitments.

The UK's 2019 update to the Climate Change Act was followed by **decarbonisation routemaps for different sectors of the economy** which were described in the 'Net Zero: Build Back Greener Strategy',[13] published in 2021. The transport sector routemap was the Transport Decarbonisation Plan,[14] described further in *DfT guidance (page 15 of this report)*.

3.3 Telford & Wrekin Council's response

Telford & Wrekin Council recognised the scale of the decarbonisation challenge by declaring a climate emergency in July 2019 and committing to:

- Carbon neutrality in the council's controlled operations and activities by 2030.
- Engaging with residents, businesses, public sector organisations and partners to work together with the aspiration for the borough to also be carbon neutral by 2030.

The council published an action plan in 2020 (updated in 2021) to start to set out what the council and borough need to do to limit the impact of climate change and meet the carbon neutrality commitments. The plan incorporates actions to reduce emissions from the borough's transport including improvements to bus and rail services and cycling and walking routes, as well as exploring EV charging facilities, e-bike hire and greener taxi licensing.

Recognising that action is needed from across the borough to achieve the scale of carbon reduction required, the council has also joined forces with businesses, Parish and Town Councils, community groups, schools, universities and others to form the Telford and Wrekin Climate Change Partnership.

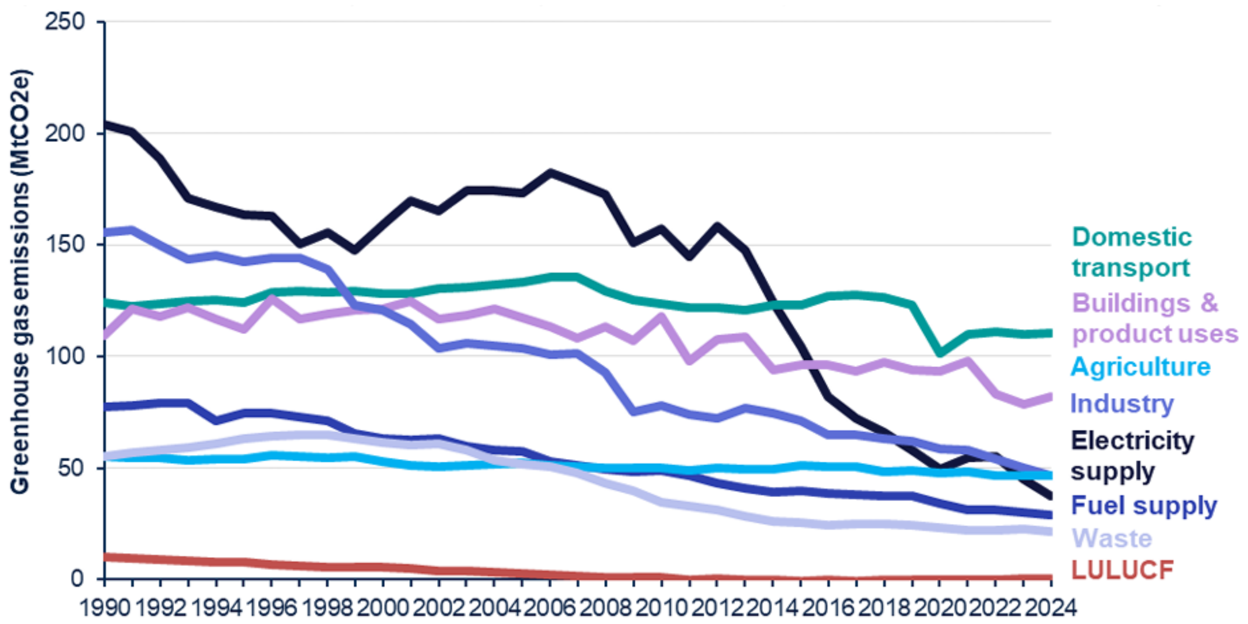
3.4 The role of the transport sector

Scale of transport sector emissions

Internationally and nationally, the transport sector contributes a significant proportion of GHG emissions and has an important role to play in meeting decarbonisation targets.

Figure 3 shows UK domestic GHG emissions by sector between 2016 and 2024, from Department for Energy Security and Net Zero (DESNZ) statistics.

[13] HM Government (2021) Net Zero Strategy: Build Back Greener: Available at: https://www.gov.uk/government/publications/net-zero-strategy
[14] DfT (2021) Decarbonising Transport: a better, greener Britain. Available at: https://www.gov.uk/government/publications/transport-decarbonisation-plan



Source: Table 1.2, Final UK greenhouse gas emissions statistics 1990-2024 Excel data tables

Note: LULUCF is land use, land use change and forestry.

Figure 3: Territorial UK GHG emissions by sector, 1990-2024 ($MtCO_2e$)[15]

Figure 3 shows that the domestic transport sector has produced more emissions than any other UK sector in each year since 2016.[16] Emissions from the sector have remained consistently high since the 1990s whilst emissions from other sectors have generally decreased over the same timeframe, meaning that the **domestic transport sector accounted for 30% of the UK's domestic GHG emissions in 2024** (including domestic aviation and shipping, surface transport accounted for 27% of the UK total).

The travel restrictions and changes in travel patterns during the COVID pandemic caused a reduction in emissions in 2020 and 2021. Then emissions levels rapidly regrew and were broadly stable between 2022 and 2024, at a lower level than transport emissions in 2019, but a considerably higher level than emissions from other sectors.

The **consistently high levels of emissions from the transport sector have been caused by growing population, a growing economy, and increased propensity to travel**. Whilst vehicle efficiency has improved considerably over this timeframe and levels of travel per person have stabilised more recently, these emissions reducing trends have been largely offset by a sustained trend amongst drivers to choose larger vehicles, particularly Sports Utility Vehicles (SUVs), which generate up to 20% more emissions per kilometre than average cars (discussed further in Appendix A).

The importance of a lifecycle perspective on transport carbon emissions

Statistics and targets relating to transport sector emissions, such as the statistics shown in *Decarbonisation pathways and emission gap (page 12)*, relate to transport user emissions, i.e. the emissions generated by the use of vehicles of all types. However, in developing an LTP, it is **important to recognise that transport decisions also have wider impacts on**

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[15] ibid

[16] DESNZ (2026) Final UK greenhouse gas national statistics, 1990 to 2024. Available at: [2024 UK Greenhouse Gas Emissions, Final Figures]

emissions through building and maintaining infrastructure, equipment and vehicles and dealing with them at the end of their lives ('capital carbon') and operating them ('operational carbon').

Figure 4 provides a simplified representation of the transport lifecycle with the dotted box highlighting the user emissions i.e. transport sector emissions.

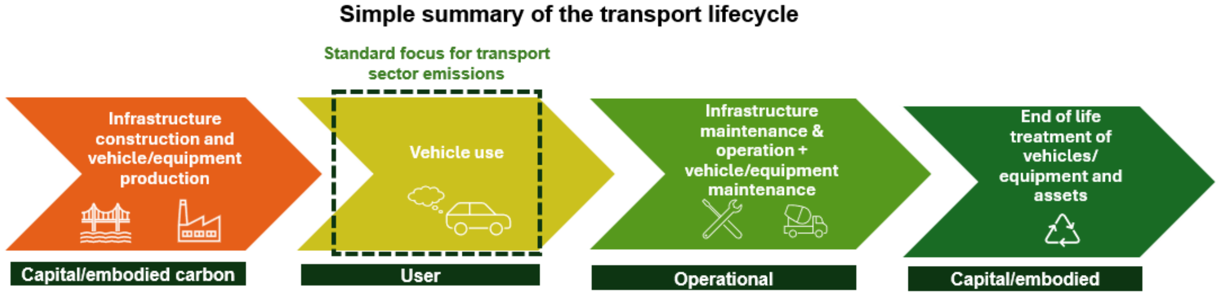

Figure 4: Simple representation of the transport lifecycle stages[17]

Emissions generated by stages outside the dotted box will contribute to sectors other than the transport sector (e.g. industry). They will all contribute to national or international emissions totals and budgets and will be directly affected by transport decisions. **It is therefore important that transport decision making for LTPs and in other contexts takes a whole life cycle perspective when considering emissions.**

Transport decarbonisation action

Decarbonisation pathways and emission gap

As transport sector emissions account for a significant proportion of national and local GHG emissions and transport decisions can influence emissions in other sectors, **transport decarbonisation action will need to play a key role in meeting national and local decarbonisation targets**.

The CCC have consistently identified the need for rapid reduction in transport sector emissions, most recently in their Sixth Carbon Budget report[18] and Seventh Carbon Budget report.[19]

The government also recognised the need for rapid transport decarbonisation in the 2021 Net Zero Strategy (NZS)[20] and DfT's 2021 Transport Decarbonisation Plan (TDP),[21] the transport sector's routemap for the NZS.

The green lines in Figure 5 show transport decarbonisation pathways identified in the NZS and CCC Sixth and Seventh Carbon Budget Reports, intended to represent a fair contribution of the transport sector (i.e. emissions from vehicle use) to meeting national

[17] Note on terms: Capital carbon is also often termed Embodied carbon. Emissions associated with maintenance and repair are sometimes labelled as Capital carbon rather than Operational carbon
[18] CCC (2020) Sixth Carbon Budget Report. Available at: Sixth Carbon Budget - Climate Change Committee (theccc.org.uk)
[19] CCC (2025) Seventh Carbon Budget Report. Available at: The Seventh Carbon Budget - Climate Change Committee
[20] HM Government (2021) Net Zero Strategy. Available at: Net Zero Strategy: Build Back Greener - GOV.UK (www.gov.uk)
[21] DfT (2021) Decarbonising Transport: a better, greener Britain. Available at: https://www.gov.uk/government/publications/transport-decarbonisation-plan

decarbonisation targets.[22] The NZS pathway was presented as a range, the upper and lower bounds of which are shown on the graph.

The blue lines in Figure 5 show projected baseline emissions reported alongside each national pathway. The CCC define baseline emissions as those that would occur without additional policy action beyond what is already committed (i.e. firmly legislated, funded, or already embedded in delivery plans). The NZS had a similar definition (assuming no additional government action after 2020) but took a more optimistic view of the ongoing rate of uptake of Zero Emissions Vehicles (ZEVs) in the absence of further action.

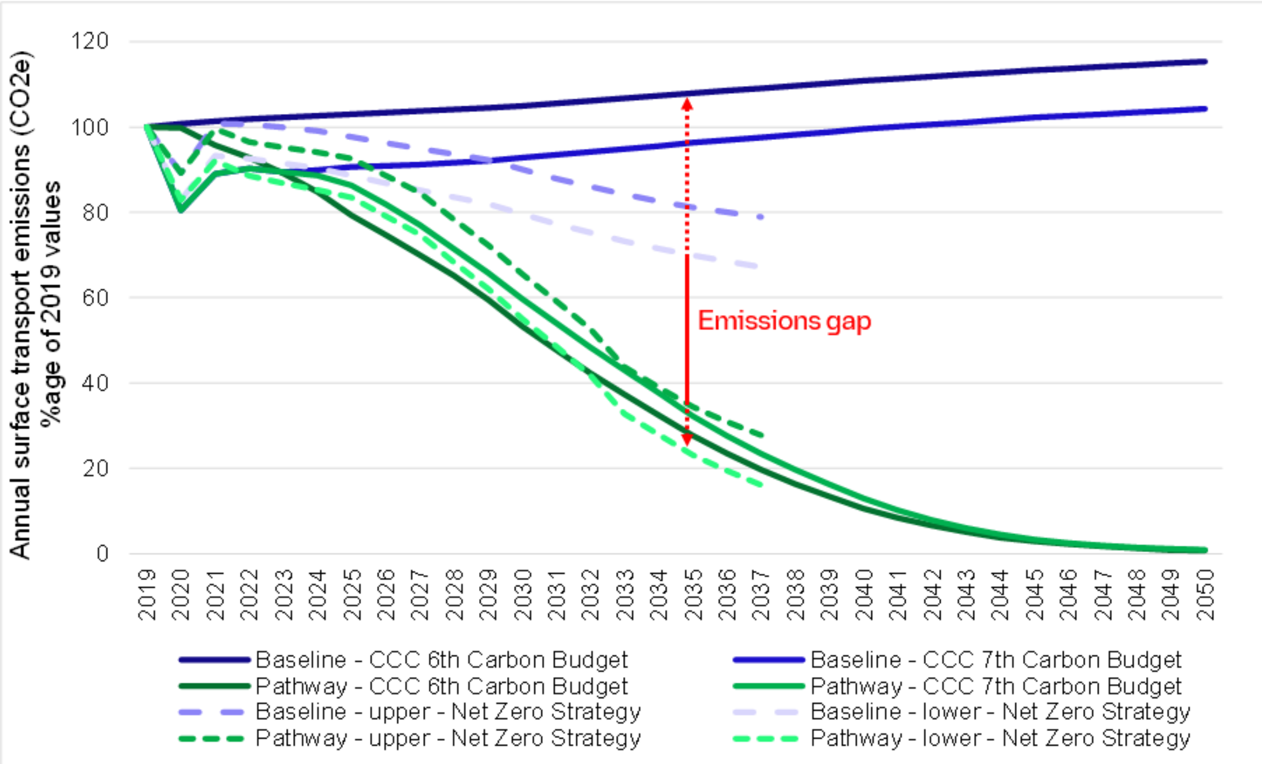

Figure 5: CCC and NZS transport decarbonisation pathways and baseline emissions projections

Comparison of the blue and green lines shows that in all scenarios there is a significant ‘emissions gap’ between the baseline emissions and target decarbonisation pathways from the 2020s onwards, highlighting the need for rapid action to reduce transport sector emissions to close the gap. If the gap is not closed, cumulative emissions will rise too quickly and ‘overshoot’ the carbon budget identified for the transport sector.

Progress in transport decarbonisation

The CCC Carbon Budget reports and the DfT’s TDP identify the **need for significant emissions reduction across all transport modes to close the national emissions gap** and contribute to meeting decarbonisation pathways and budgets.

The TDP sets out the steps that national government, local government, businesses and society need to take to deliver the reductions required. It recognises that diverse action at a range of scales will be required to reduce emissions through changes in travel choices

[22] The CCC pathways are described as representing the surface transport component of the CCC’s view of a feasible and balanced pathway to achieving the UK’s net zero and intermediate emissions reductions targets and budgets.

and patterns and ZEV uptake to achieve the pace and scale of decarbonisation required in the transport sector.

In the years since the TDP, **decarbonisation action has focused on encouraging ZEV uptake** and the emphasis of government strategies and plans has moved away from highlighting decarbonisation as an objective. For example, the recent Better Connected Strategy for Integrated Transport[23] focuses primarily on improving how the transport system works for users and does not directly refer to decarbonisation as a driver for the national and local transport measures proposed, although many of the proposals have the potential for a positive impact on decarbonisation.

The government's cross-sector Carbon Budget and Growth Delivery Plan (CBGDP)[24] published in October 2025 continues to focus on ZEV uptake as the primary route to surface transport decarbonisation. The main measures cited are the ZEV Mandate for cars and vans and supporting regulations (described further in *Baseline and projected transport sector emissions in Telford and Wrekin (page 18)* and proposed measures to phase out diesel HGV sales (as consulted on during early 2026), supported by charging infrastructure roll out and measures such as ZEV purchase grants. Only minor allowances are made for emissions reduction through increased car occupancy and mode switch to active travel.

A recent assessment of surface transport carbon reduction progress and plans[25] has been undertaken as part of the INFUZE research project led by University of Leeds.[26] The review highlights that the **five years of limited action since the TDP have made transport decarbonisation considerably more challenging** and mean that achieving some pathways and targets is no longer possible.

The surface transport decarbonisation pathway set out in the CBGDP is identified as being less ambitious than the TDP and CCC pathways, leaving an emissions gap and meaning that following the pathway will not meet the transport budget set out in the CCC's Seventh Carbon Budget report. With the assumptions used, an estimated 15% overshoot of the CCC's budget is projected.

The review also indicates **a high risk of a more significant overshoot of the CCC's surface transport budget** as some of the underlying CBDGP assumptions are considered ambitious. In particular, the rate of purchase of new vehicles, required to achieve the rapid rate of ZEV uptake assumed, is considered unrealistic given recent trends. If purchase rates are lower (e.g. current trends continue) decarbonisation will be slower than projected in the CBGDP, causing further overshoot of the CCC's indicated budget.

If the surface transport sector overshoots its budget, other sectors will need to emit less to keep the UK within its legally binding national budgets. Given the surface transport sector generates the most emissions and the budgets for other sectors are already

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[23] DfT (2026) – Better Connected: a strategy for integrated transport. Available at: Better Connected: a strategy for integrated transport - GOV.UK

[24] HM Government (2025) Carbon Budget and Growth Delivery Plan. Available at: Carbon budget and growth delivery plan - GOV.UK

[25] Marsden, G. (2026) Overshoot: An analysis of progress, risks and opportunities for decarbonising surface transport. Report. University of Leeds Available at: Overshoot: An analysis of progress, risks and opportunities for decarbonising surface transport - White Rose Research Online

[26] INFUZE is a 5 year research project to find out what kind of future transport systems can work better for people, business and places. It is led by the Institute for Transport Studies at the University of Leeds, along with research partners The Royal College of Art and Lancaster University. 25 government, industry and third sector partners are also actively involved in the project INFUZE - better transport for everyone

challenging, this is unlikely to be achieved. The issue is accentuated when taking the WLC perspective of transport related emissions. The assumed rapid rate of new vehicle purchase implies significant emissions from vehicle manufacture, particularly of batteries.

Given this context, The INFUZE paper stresses the **importance of minimising surface transport sector overshoot of its budget**, with any decarbonisation contribution considered useful. Along with measures to support accelerated ZEV uptake, suggestions include measures to change approaches to ownership and use of vehicles (to support increased sharing of a smaller fleet of vehicles) and action to reduce the number of vehicle kilometres travelled.

Role of local decarbonisation action

The INFUZE paper highlights **that local action has an important role in supporting decarbonisation**. The role of local government and Local Transport Plans was also highlighted in the TDP. The Plan highlights that, as LTPs are statutory documents that set out improvements to transport networks, they need to show how local authorities will deliver ambitious carbon reductions. To support this process, the DfT committed to providing guidance to local authorities for producing LTPs including guidance relating to developing measures that will result in quantifiable carbon reductions.

The statutory guidance for LTPs[27] referenced in the TDP was published alongside the Better Connected Strategy and places a greater but still relatively limited emphasis on decarbonisation. However, it does include **the requirement for LTAs to use the DfT's Quantifiable Carbon Guidance (QCG)[28] to assess and understand the impact of proposed LTP measures**. LTAs are required to use the QCG to report on 'annual transport carbon impacts to 2050 (including user and infrastructure emissions)' which is one of 20 indicators included the local transport outcome framework established to reflect DfT's priorities for outcomes from local transport funding and hold Local Transport Authorities to account on their performance in delivering them through LTPs.

DfT guidance

The DfT's QCG was published in August 2025 and was developed to provide practical advice on how authorities can undertake and use whole life carbon analysis to inform the development of their LTPs (and other transport strategies) and individual transport schemes. It is intended to address the limitations of existing guidance and particularly the absence of carbon analysis guidance at a transport strategy level which has limited local authorities' ability to consider carbon impacts at the earliest stages of transport planning when there is greatest scope for influence.

Figure 6 sets out the **QCG's suggested process for incorporating carbon considerations within the development of a Local Transport Plan** (extracted from Figure 2-1 in the QCG).

[27] DfT (2026) Statutory Guidance for LTPs. Available at: Local transport plans - GOV.UK
[28] DfT (2025) Quantifiable Carbon Guidance. Available at: Local Transport Quantifiable Carbon Guidance

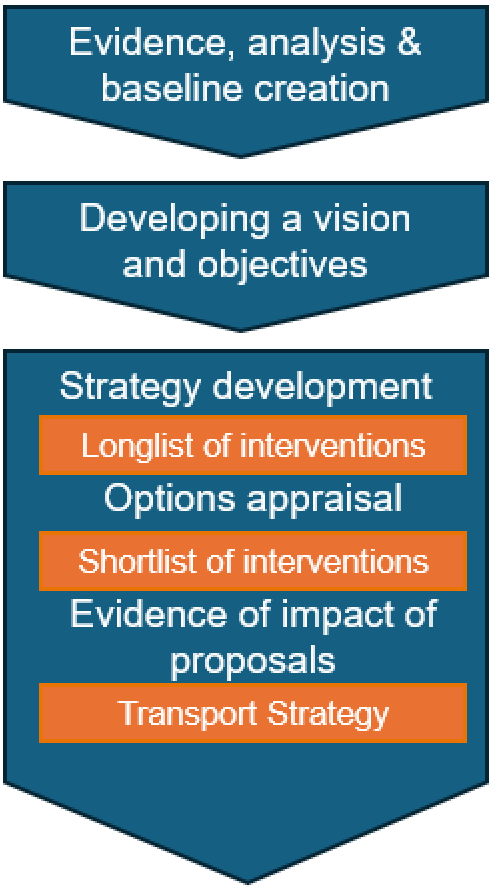

Figure 6: QCG Carbon Analysis Process for Transport Strategy Development

The QCG advises that the first step is necessary to ensure that LTP development is informed by a sound understanding of the transport carbon baseline and projected emissions under different views of the rate of ZEV uptake. The projections provide a comparison to the national transport decarbonisation pathways shown in Figure 5. Comparison of the emissions projections and pathways indicate the 'emissions gap' at the local scale i.e. the scale of reduction from projected baseline emissions needed each year to align with decarbonisation commitments. This provides important context on the scale of the decarbonisation challenge to inform the development of the TWTP and the types of policy and measure to include within it.

The QCG also highlights the value of developing an understanding of the source of emissions by understanding the disaggregation of total emissions between categories such as vehicle type, road type, trip length, journey purpose and area type. This analysis helps to provide a basis for identifying the types of measure that would be most effective in targeting the main sources of emissions.

The remainder of this report summarises the results of the first step of carbon analysis for the TWTP i.e. evidence, analysis and baseline creation. *Baseline and projected transport sector emissions in Telford and Wrekin (page 18)* summarises current and projected emissions and illustrates the emissions gap for Telford and Wrekin. *Transport emissions by source (page 27)* and *Geographical distribution of emissions (page 39)* summarise the disaggregation of emissions by source and location. *Whole life cycle emissions (page 55)* provides an overview of wider lifecycle emissions and *Summary* *considerations for the TWTP (page 62)* draws on the previous sections to identify key considerations for the TWTP.

The analysis presented largely draws on output from the Midlands Connect Baseline Emissions Dashboard[29] which was developed by Midlands Connect to provide all authorities within their area with ready access to consistent emissions baseline analysis. The analysis aligns with and is part of the national Carbon Assessment Playbook[30] developed by Midlands Connect and other subnational transport bodies (STBs) to provide authorities with a consistent approach to developing a high-level understanding of the impact of different types of transport decarbonisation measures.

The QCG recommends the use of existing regional baseline analysis to support LTP development on the grounds of efficiency and consistency of analysis between LTPs. The data presented in the next three chapters has therefore been drawn from the Midlands Connect Baseline Emissions Dashboard dataset where possible. It is supplemented by additional analysis (for instance on emissions by population segment and additional traffic model analysis) that was developed using the Telford Strategic Transport Model (TSTM), CREDS place based carbon calculator[31] and National Travel Survey data for a previous carbon baselining exercise undertaken for Telford and Wrekin in 2023.[32]

[29] The Baseline Emissions Dashboard is one of the Midlands Connect apps for local authorities– available at https://portal.mcdigital.live/portal - login required

[30] Carbon Assessment Playbook - data, tools and guidance to support evidence-informed carbon reduction in local transport planning. Available at: Carbon Assessment Playbook

[31] CREDS carbon tool (Place-based carbon calculator). Source: Morgan, Malcolm, Anable, Jillian, & Lucas, Karen. (2021). A place-based carbon calculator for England. Presented at the 29th Annual GIS Research UK Conference (GISRUK), Cardiff, Wales, UK (Online): Zenodo. A place-based carbon calculator for England | Zenodo) and represents all car travel by the borough's residents for all purposes, whether in Telford & Wrekin or beyond the borough boundaries.

[32] The previous baselining analysis undertaken by AtkinsRéalis in 2023 used outputs from the Telford Strategic Transport Model (TSTM) to produce many of the same outputs produced by the Baseline Emissions Dashboard analysis, such as emissions by vehicle type, trip type and journey purpose. A comparison of the two sets of outputs showed consistency in the messages on the balance of emissions by source. The Midlands Connect results have been presented in this report where available for consistency with analysis by other authorities.

4. Baseline and projected transport sector emissions in Telford and Wrekin

Key points on baseline and projected transport sector emissions in Telford and Wrekin

Transport sector emissions accounted for nearly 35% of greenhouse gas emissions within Telford and Wrekin in 2023.

There are a number of **uncertainties** in projections of future transport emissions, including in relation to future travel demand, vehicle purchase trends and rates of decarbonisation of electricity supply. However, despite uncertainty, p**rojections indicate that baseline transport emissions will exceed the decarbonisation pathways to 2050** identified by the Climate Change Committee and Government Net Zero Strategy to meet national decarbonisation targets, meaning that there will be a **significant 'emissions gap' between projections and pathways.**

The Local ZEV Uptake scenario from the Midlands Connect Emissions Baseline Dashboard is intended to provide a realistic representation of current and planned national proposals to encourage ZEV uptake. **By 2030, closing the emissions gap between the Local ZEV scenario and the decarbonisation pathways would require an emissions reduction of approximately 30%.** By 2035 the reduction required would be approximately 50%, and over 70% in the 2040s.

Accelerated ZEV uptake will be important but even ambitious assumed uptake rates are not enough alone to close the 'emissions gap'. Telford & Wrekin Council and other stakeholders would need to implement diverse additional decarbonisation measures to close the gap through reducing the number of vehicle kilometres travelled.

The patterns seen in Telford and Wrekin are consistent with patterns in other authorities across the country, highlighting the scale of the challenge at the national level.

4.1 Introduction

This section sets out current and projected transport sector emission levels in Telford and Wrekin. This provides the basis for estimating the 'emissions gap' between projected emissions levels and the decarbonisation pathways that emissions would need to follow for the transport sector to contribute to national decarbonisation targets.

4.2 Current emissions in Telford and Wrekin

Emissions in Telford and Wrekin

Figure 7 shows GHG emissions by sector in Telford and Wrekin between 2005 and 2023, based on DESNZ statistics[33].

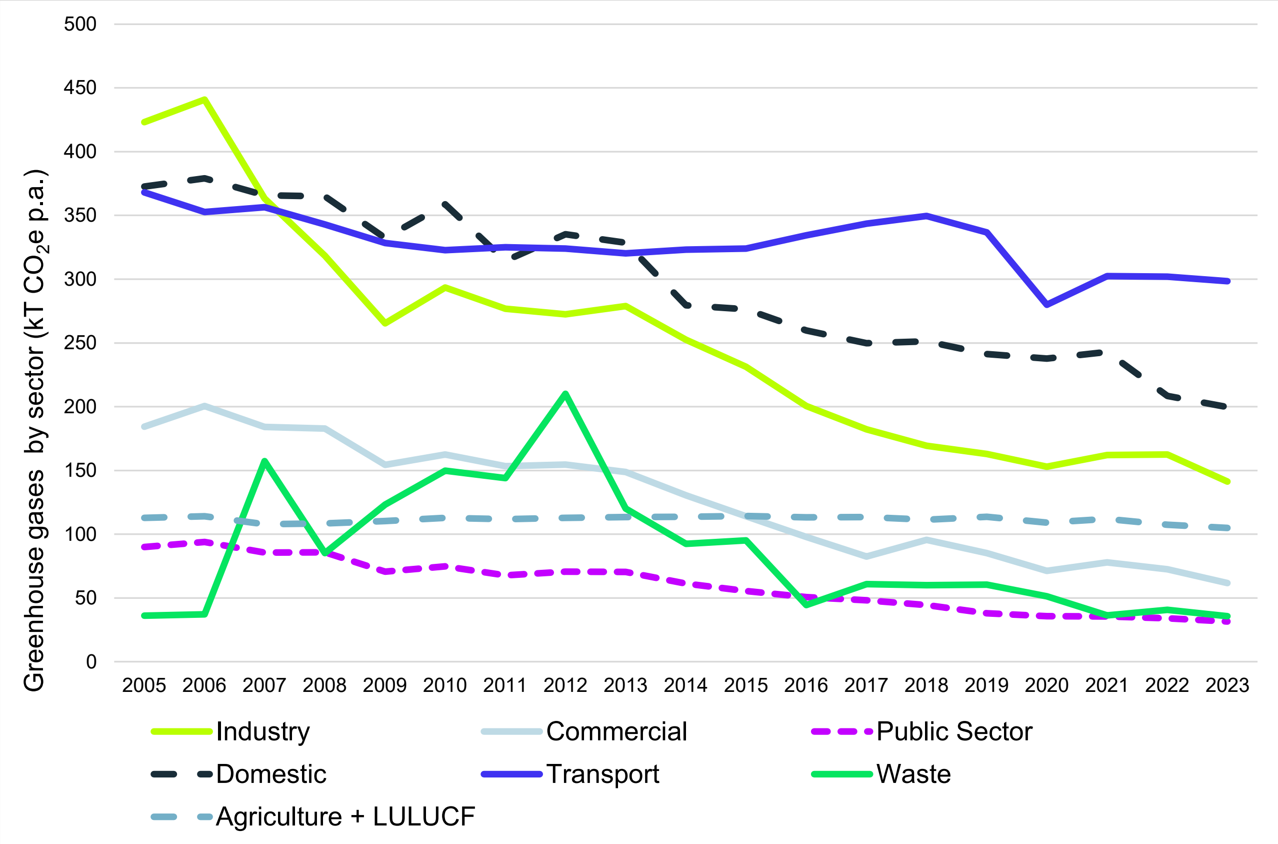

Figure 7: Telford & Wrekin GHG emissions by sector, 1990-2023 ($MtCO_2e$)

The figure shows that the pattern of GHG emissions across sectors within Telford and Wrekin over recent years is **similar to the national pattern** shown in Figure 3. The transport sector has generated more emissions than any other sector in Telford and Wrekin since 2014[34] and emissions declined slowly between 2005 and 2019, whilst emissions from other sectors (including industry and domestic and commercial buildings) steadily decreased over the 15 years to 2019. Emissions from non-transport sectors in Telford and Wrekin reduced by 40% to 45%, whilst transport emissions varied by less than 10% over the 15 year period before COVID. Transport emissions dropped in 2020 as a result of the impacts of the COVID pandemic. They then rose again in 2021 and were broadly stable in 2022 and 2023 at a lower level than transport emissions in 2019 but a considerably higher level than emissions from other sectors.

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[33] Department for Energy Security and Net Zero (2025) UK local authority and regional greenhouse gas emissions, 2005 to 2023. Available at: [UK local authority and regional greenhouse gas emissions statistics, 2005 to 2023 - GOV.UK]()

[34] Note the classification of some of the other sectors differs between the Telford and Wrekin data and national data. The national transport sector emissions also include domestic shipping and aviation emissions (accounting for approximately 8% of the total in 2024) whereas local authority transport emissions include only emissions from road and rail transport within the relevant boundary

In 2023, the **surface transport sector generated 34% of total GHG emissions within Telford and Wrekin**, nearly 300 kT CO_2e.[35]

The DESNZ dataset also provides an indication of CO_2 emissions[36] that are considered to be within scope of local authority influence. For transport, this excludes emissions that are associated with rail and motorway use. For other sectors, it excludes sources such as large industrial sites. Of the subset of CO_2 emissions considered to be within local authority influence, transport accounted for 38% of the total in 2023.

Figure 8 presents total transport GHG (CO_2e) emissions in Telford and Wrekin from 2018 to 2023,[37] alongside total CO_2 emissions in the authority and the CO_2 emissions identified by DESNZ as being within scope for local authority influence.

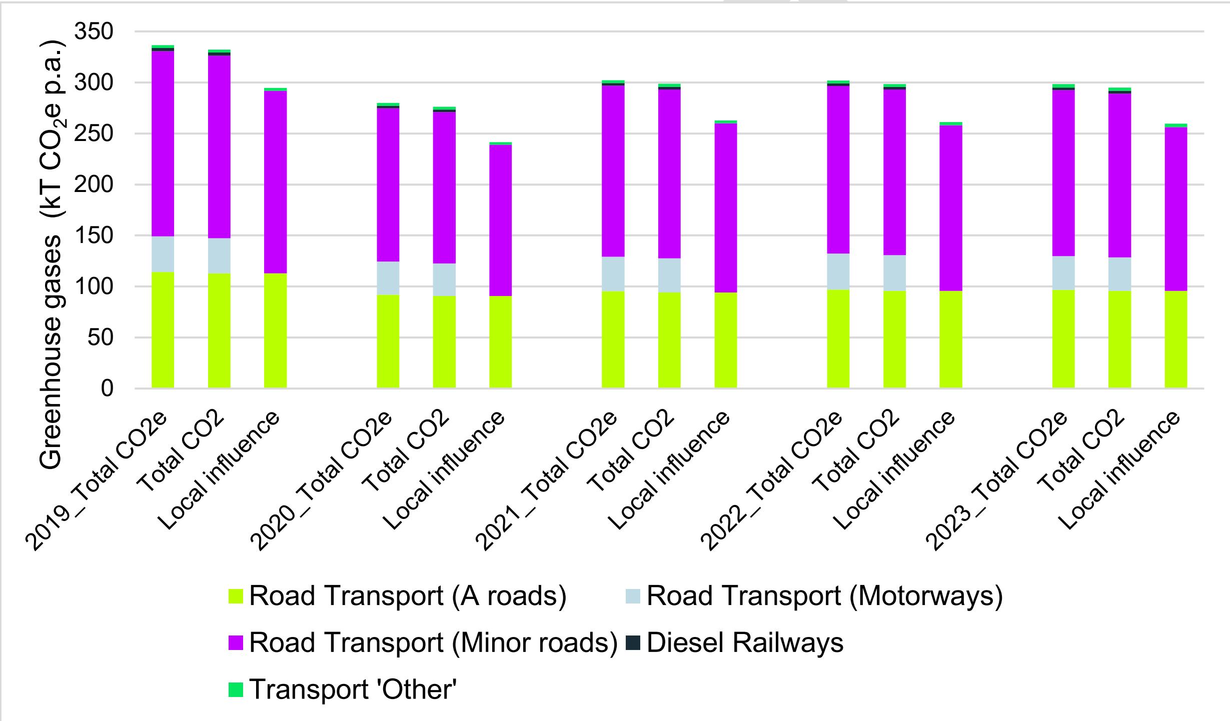

Figure 8: Transport CO_2 and CO_2e emissions within Telford and Wrekin by year

Across all the years, CO_2 accounts for 99% of transport GHG emissions, and emissions considered to be within scope of local influence (i.e. primarily emissions from traffic on A roads and minor roads) account for nearly 90% of total transport emissions.

Comparison with similar authorities

Figure 9 shows the DESNZ[38] estimates of transport and other sector emissions per resident in 2023 for Telford and Wrekin and a number of other unitary authorities. The averages across the West Midlands and England are also shown for comparison. The totals include only those emissions that are considered to be within local authority influence (as described above).

[35] Department for Energy Security and Net Zero (2025) UK local authority and regional greenhouse gas emissions, 2005 to 2023. Available at: UK local authority and regional greenhouse gas emissions statistics, 2005 to 2023 - GOV.UK

[36] The dataset covers carbon dioxide emissions only, no other greenhouse gases.

[37] 2023 is the most recent year for which data is currently available

[38] Department for Energy Security and Net Zero (2025) UK local authority and regional greenhouse gas emissions, 2005 to 2023. Available at: UK local authority and regional greenhouse gas emissions statistics, 2005 to 2023 - GOV.UK

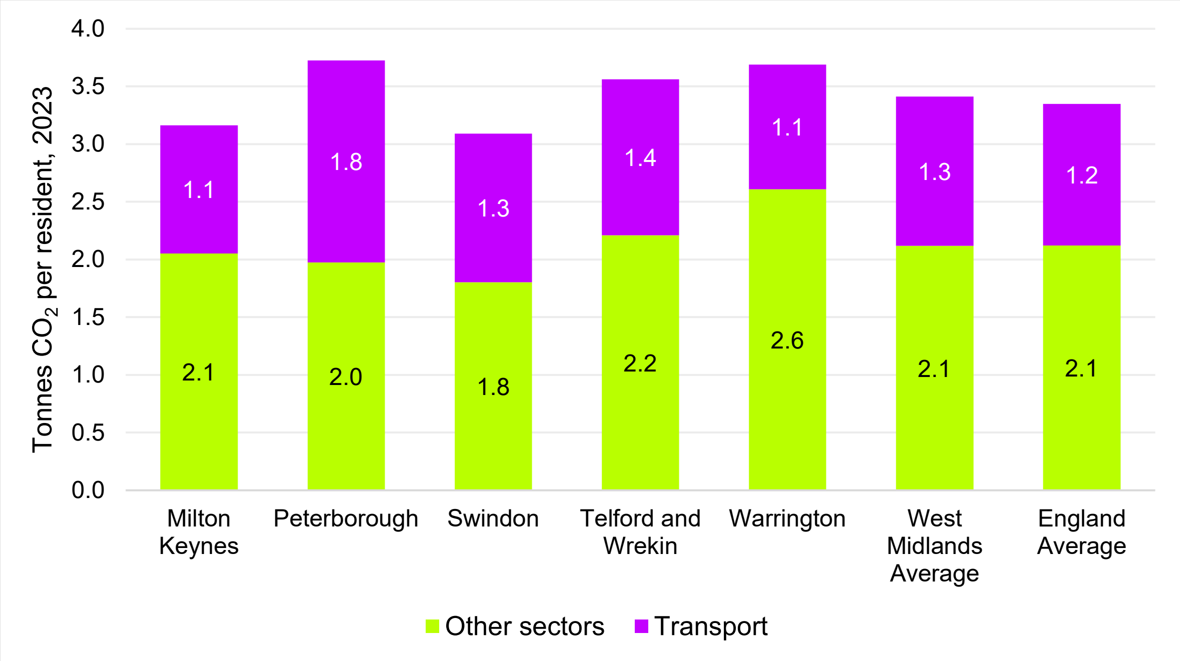

Figure 9: 2023 Emissions per resident within Local Authority control for Telford and Wrekin, other unitary authorities, West Midlands and England (Source: DESNZ)

The comparison indicates that the scale of transport emissions generated in Telford and Wrekin is **comparable with similar authorities**. Across the authorities transport emissions vary from 1.1 to 1.8 tonnes per resident per year, accounting for from 29% to 47% of total emissions per capita. Telford and Wrekin falls in the middle of the range, with each resident generating approximately 1.4 tonnes of emissions through transport use each year, accounting for about 38% of total emissions per capita. Emissions per resident from the transport sector are about 5% higher in Telford and Wrekin than the regional average and 10% higher than the national average. Emissions from other sectors are within 5% of both the regional and national averages.

4.3 Projected emissions in Telford and Wrekin

Emissions scenarios

To provide context for the development of the TWTP and decisions on the types of policy and measure to include, it is important to understand how emissions are projected to change over the TWTP time period if no further action is taken.

Two key factors will determine future transport emissions levels:

- Changes in the number of vehicle kilometres travelled by different categories of vehicles (cars, vans, heavy goods vehicles, buses), reflecting changes in trip numbers, trip lengths and mode choice; and
- The composition of the fleet for each vehicle category (in terms of the proportions of vehicles of different sizes, efficiency and fuel/energy source), determining emissions produced per kilometre travelled (along with driving conditions and speeds, particularly congestion levels).

There is uncertainty around both of these key driving factors. Future vehicle kilometre levels will be influenced by factors including economic and population growth and behavioural change (such as the rebound effect).[39] Future fleet composition will be particularly influenced by uptake of ZEVs, particularly electric vehicles (EVs).

There are also other areas of uncertainty that could influence future emissions projections such as the rate of decarbonisation of the electricity supply and rate of uptake of Sports Utility Vehicles which use 15% to 20% more fuel or electricity per kilometre than average cars. Appendix A provides further detail on each of the main areas of uncertainty in transport emissions projections.

The Midlands Connect Baseline Emissions Dashboard reflects elements of the uncertainty in future emissions projections by presenting three different emissions scenarios for each local authority. Each scenario makes different assumptions on the speed of uptake of ZEVs and the extent to which uptake will continue, reflecting different representation of national measures to encourage ZEV uptake (see box). Other variables such as growth in vehicle kilometres, rate of SUV uptake and rate of electricity decarbonisation are consistent between the scenarios.[40]

National measures to reduce vehicle emissions and encourage ZEV uptake

Between 2009 and 2023 the UK regulated vehicle CO_2 emissions primarily through average exhaust emissions standards for each vehicle manufacturer's fleet, in line with EU law. Target fleet averages in gCO_2/km for new cars and vans in each fleet were steadily reduced over this period.

The **Zero Emission Vehicle Mandate** then came into force in January 2024 (underpinned by the Vehicle Emissions Trading Schemes Order 2023). It sets annual minimum targets for the proportion of new zero emission cars and vans sold in the UK, starting at 22% for cars and 10% for vans in 2024 and rising steadily to reach 80% of cars and 70% of vans by 2030, on a pathway to 100% by 2035. It is complemented by a CO2 emissions regulation that prevent increases in average exhaust emissions from remaining petrol and diesel vehicles during the transition. From 2030, manufacturers will need to ensure the overall CO2 emissions from their petrol and diesel cars are 10% lower than in 2021.

The ZEV Mandate and regulations effectively deliver the previous government commitment to **phase out the sale of new petrol and diesel cars and LGVs, including hybrids by 2035**.

The government has also made a policy commitment to **end the sale of fully petrol and diesel cars and vans by 2030 and diesel HGVs under 26 tonnes by 2035 and HGVs over 26 tonnes by 2040**, but this is not yet supported by regulation (consultation on regulation was undertaken in early 2026).

The Dashboard scenarios are also used in the STBs' Carbon Assessment Playbook and are described as follows.

[39] The rebound effect refers to the response where reduced travel costs causes people to choose to increase the amount they travel (more and/or longer trips)
[40] Growth in vehicle kilometres is based on growth from the Core Scenario of the DfT's Road Traffic Projections 2022 National road traffic projections - GOV.UK. SUV uptake and electricity decarbonisation follow the assumptions underpinning the TAG Data Book, May 2023. TAG data book - GOV.UK

- **Business as Usual (UE-BAU):** A national future scenario based on firm and funded policies, using the assumptions included in the DfT's TAG May 2023 Data Book. This scenario assumes a rapid rate of ZEV uptake to 2030, for instance assuming 15% of car vehicle kms will be driven by ZEVs by 2025 and 36% by 2030 (as shown in Figure 10). The rapid uptake assumed is explained as being the result of 2025 to 2030 CO_2 regulations for manufacturers and reductions in battery prices. However, the assumptions already appear ambitious (for instance only 7.3% of licenced cars nationally were battery EVs or plug in hybrids by Q3 in 2025,[41] compared to the 15% of vehicle kms by ZEVs assumed in the scenario). The forecast does not include representation of the ZEV mandate or bans on new diesel HGV sales because they were not committed in 2023. Consequently, the ZEV uptake rate is assumed to slow considerably in the 2030s and 2040s.
- **Localised scenario of ZEV uptake (UE-ZEV-LA):** described in the Playbook as a more realistic future based on expected policy (e.g. including the ZEV mandate and measures to encourage uptake of ZE HGVs) and an assumption that EV charging provision continues in line with demand. The scenario is localised to each local authority; reflecting how ZEV uptake might differ based on characteristics of each place. Other variables remain as per the BAU scenario. The assumed ZEV mileage proportion of 5% for cars in 2025 for Telford and Wrekin (see Figure 11) aligns well with observed uptake for cars (4.7% of cars licenced in Telford in Wrekin at the end of Q3 in 2025 were EVs).[42] However, the scenario appears to overstate uptake to date for LGVS (1.5% of licenced LGVs were EV in Telford and Wrekin, compared to 5% assumed, although the observed figure for West Midlands was 3.4% which influence a significant proportion of van mileage on Telford and Wrekin's roads as a result of cross boundary trips, discussed further in *Geographical distribution of emissions (page 39)*).
- **Accelerated ZEV (UE-ZEV):** A national scenario of ambitious ZEV uptake, likely to represent a best-case scenario of ZEV uptake. The scenario assumes the highest uptake compared to a range of recent electric car uptake projections (described in more detail in Appendix A). Further national policies (in addition to the ZEV mandate and proposed sales bans) would be necessary to realise this scenario which assumes that over 40% of car miles are by ZEV in 2030 and nearly 10% of HGV miles (see Figure 12). Other variables remain as per the BAU scenario.

Vehicle	2025	2030	2035	2040	2045
Car	15%	36%	52%	62%	66%
LGV	2%	5%	16%	29%	38%
HGV	0%	0%	0%	0%	0%
PSV	16%	28%	30%	31%	32%

Figure 10: Business as usual (UE-BAU) - ZEV uptake assumptions for Telford and Wrekin by year

[41] Derived from DfT (2026) Vehicle Licensing Statistics Table VEH0105 Licensed vehicles at the end of the quarter by body type, fuel type, keepership (private and company) and upper and lower tier local authority: Great Britain and United Kingdom and VEH0142 Licensed plug-in vehicles (PiVs) at the end of the quarter by body type, fuel type, keepership (private and company) and upper and lower tier local authority: United Kingdom including battery electric vehicles and plug in hybrids
[42] Ibid

Vehicle	2025	2030	2035	2040	2045
Car	5%	21%	48%	74%	89%
LGV	5%	21%	48%	74%	89%
HGV	0%	2%	5%	21%	48%
PSV	5%	21%	48%	74%	89%

Figure 11: Localised ZEV uptake (UE-ZEV-LA) - ZEV uptake assumptions for Telford and Wrekin by year

Vehicle	2025	2030	2035	2040	2045
Car	13%	41%	70%	88%	96%
LGV	4%	28%	61%	81%	91%
HGV	0%	9%	36%	70%	91%
PSV	16%	36%	62%	82%	93%

Figure 12: Accelerated ZEV uptake (UE-ZEV) - ZEV uptake assumptions for Telford and Wrekin by year

Emissions gap

Figure 13 shows the three Midlands Connect Dashboard projected emissions scenarios (as blue lines) against the national transport decarbonisation pathways shown in Figure 5 (scaled for Telford and Wrekin) i.e.,

- CCC Sixth Carbon Budget report balanced pathway for surface transport.
- CCC Seventh Carbon Budget report balanced pathway for surface transport.
- Mid-point of the upper and lower bounds of the Net Zero Strategy pathway.

The **difference between the blue and green lines indicates the scale of the 'emissions gap'** that needs to be closed if the transport sector in Telford and Wrekin is to make its contribution to national carbon reduction targets.

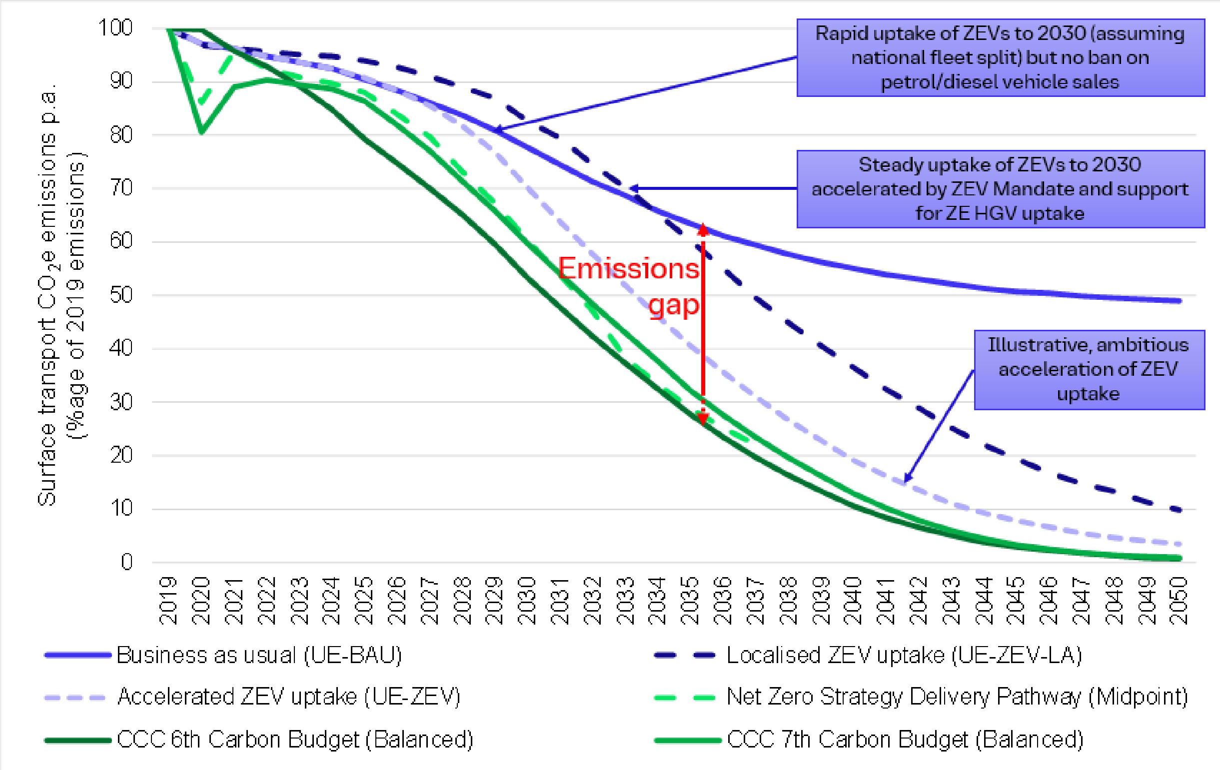

Figure 13: Telford and Wrekin's surface transport baseline emissions and decarbonisation pathways

As outlined above, the Localised ZEV uptake scenario is considered the most realistic of the projections of transport emissions in Telford and Wrekin, given current forecast levels of traffic growth and plans to support ZEV uptake.[43]

Comparing the Localised ZEV projection to the national decarbonisation pathways indicates that **closing the emissions gap in 2030 would need an estimated further reduction in emissions of around 30%,** in addition to the national action to accelerate ZEV update (i.e. ZEV mandate, associated regulations and proposed sales bans, as represented in the Localised ZEV uptake scenario). **By 2035 the percentage reduction required to close the gap is estimated to be around 50%, by the 2040s it is over 70%.**

The pathways in Figure 13 highlight the significant scale of the decarbonisation challenge faced in Telford and Wrekin and nationally. Closing the emissions gap would require rapid and significant reductions in carbon emissions in the transport sector (alongside all other emitting sectors). Comparison with the Accelerated ZEV Uptake scenario shows that even the ambitious assumptions on **accelerated progress to a zero emissions fleet are not enough to close the gap alone**. Substantial additional action would be required to reduce emissions by **reducing the number of vehicle kilometres travelled**.

[43] The Localised ZEV scenario is considered most realistic because:

- Achieving the Accelerated ZEV (UE-ZEV) uptake scenario would require substantial further national action in addition to existing plans and proposals (i.e. the ZEV mandate and sales bans). It therefore represents an illustrative scenario, indicative of the upper bound of impact that could be achieved through ZEV uptake with considerable further effort (as illustrated by the comparison with other scenarios in Appendix A), rather than a baseline projection.
- The UE-BAU scenario assumes a more ambitious rate of ZEV uptake to 2030 and then slower rate of ZEV uptake beyond 2030 than is likely given existing uptake, plans and proposals.

4.4 Key considerations for the TWTP

The overview of current and projected emissions levels in Telford and Wrekin in this section has highlighted the following key considerations to inform the development of the TWTP:

- **Rapid and significant transport decarbonisation will be needed if Telford and Wrekin is to meet decarbonisation targets**. Transport accounted for nearly 35% of GHG emissions in the borough in 2023 and there is a substantial 'emissions gap' between projected emissions and Government and CCC decarbonisation pathways in Telford and Wrekin, as there is nationally.
- **Diverse decarbonisation measures would be needed to close the emissions gap** which would involve reducing emissions from the baseline by approximately 30% in 2030, 50% in 2035, and over 70% in the 2040s.
    - Action to accelerate ZEV uptake beyond the levels projected in response to current and proposed measures would play an important role but would not be enough alone.
    - Additional action would need to reduce emissions by reducing the number of vehicle kilometres travelled.

5. Transport emissions by source

Key points on transport emissions by source

Local data (from the Midlands Connect Dashboard, Telford Strategic Transport Model, National Travel Survey and CREDS place based carbon calculator) provide insights into the breakdown of transport emissions in Telford and Wrekin by source that help to understand potential areas of focus for decarbonisation measures. Key points include:

- **Vehicle Type – cars were estimated to account for 59% of transport emissions within Telford and Wrekin in 2019**. This proportion will reduce through time as the car fleet is expected to transition to ZEVs more quickly than other vehicle types. LGVs accounted for an estimated 17% of emissions in 2019 and are also expected to transition to ZEVs quickly. However, above average traffic growth rates are expected to balance out at least some of the decarbonisation benefits of electrification. HGVs accounted for an estimated 19% of emissions in 2019. The proportion will rise as the transition to ZEVs for goods vehicles is expected to be relatively slow.
- **Road type – traffic on the Local Road Network is estimated to account for approximately 45% of road emissions in Telford and Wrekin**, the Major Road Network for just over 20% and the Strategic Road Network for nearly 35%.
- **Trip type – long trips account for the majority of emissions** despite accounting for a small proportion of trips. For instance, the Midlands Connect Dashboard estimates that **trips over 10 miles long account for over 65% of road vehicle emissions within Telford and Wrekin**. The balance varies considerably by vehicle type with a higher proportion of emissions from HGVs and LGVs being generated on longer trips than emissions from car trips. Trips for business (including road freight) account for approximately 50% of emissions within Telford and Wrekin across all vehicle types. For car trips, leisure travel is the single largest category, accounting for approximately 35% of car emissions.
- **Population segment** – Car emissions per resident tend to be higher in more remote, rural locations and where residents have above average incomes. In contrast, those living in urban areas and those with lower incomes tend to travel less by car. **More rural and prosperous population groups can generate more than double the carbon emissions from car use than more urban, lower income groups.**

A wide range of decarbonisation measures would be needed to respond to the range of emissions sources identified and to the varying characteristics across Telford and Wrekin. Measures would also need to reflect the varying level of influence that different stakeholders will have on different element of emissions. For instance, Telford & Wrekin Council and local stakeholders are likely to have most influence on car emissions and least influence on freight.

5.1 Overview

This section provides further information on the sources of transport sector emissions (i.e. emissions from vehicle use) within Telford and Wrekin's boundaries. Information is provided on the balance of emissions between different:

- Vehicle types
- Road types
- Trip types – trip length and purpose
- Population segments

The detail is intended to provide a better understanding of the emissions sources that would need to be targeted to contribute towards the reduction in transport emissions required to close the emissions gap meet decarbonisation targets, as described in the previous section.

Much of the analysis is based on data available from the Midlands Connect Emissions Baseline Dashboard and therefore uses the 2019 baseline used in the Dashboard. Where figures for future year emissions are shown they are taken from the Business as Usual (BAU) scenario (i.e. assuming rapid ZEV uptake to 2030 and a flattening of uptake beyond), in line with the data available in the Dashboard.

5.2 Emissions by vehicle type

Figure 14 shows the estimated baseline transport emissions in Telford and Wrekin in 2019 disaggregated by vehicle type.

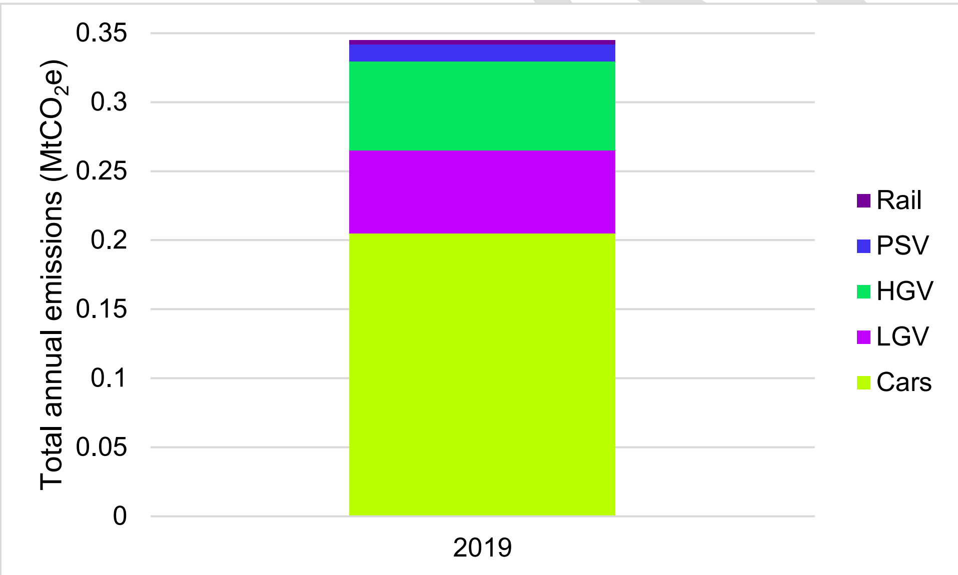

Figure 14: Emissions by vehicle type, 2019 ($MtCO_2e$ p.a.) (Source: Midlands Connect Dashboard)

Car traffic is estimated to account for 59% of emissions, Heavy Goods Vehicles (HGVs) account for an estimated 19%, Light Goods Vehicles (LGVs) for 17%, buses 4% and rail 1%. The equivalent figures for the UK in 2019 were similar, with 61% of total surface transport emissions generated by cars, 17% by HGVs, 17% by LGVs, 3% by rail and 2% by buses.[44]

[44] As quoted in the Transport Decarbonisation Plan: DfT (2021) Decarbonising transport: A better, greener Britain. Available at: Transport decarbonisation plan - GOV.UK (www.gov.uk)

Figure 15 shows forecast emissions in Telford and Wrekin by vehicle type through time under the Midlands Connect Business as Usual (BAU) scenario (as described in *Baseline and projected transport sector emissions in Telford and Wrekin (page 18)*).

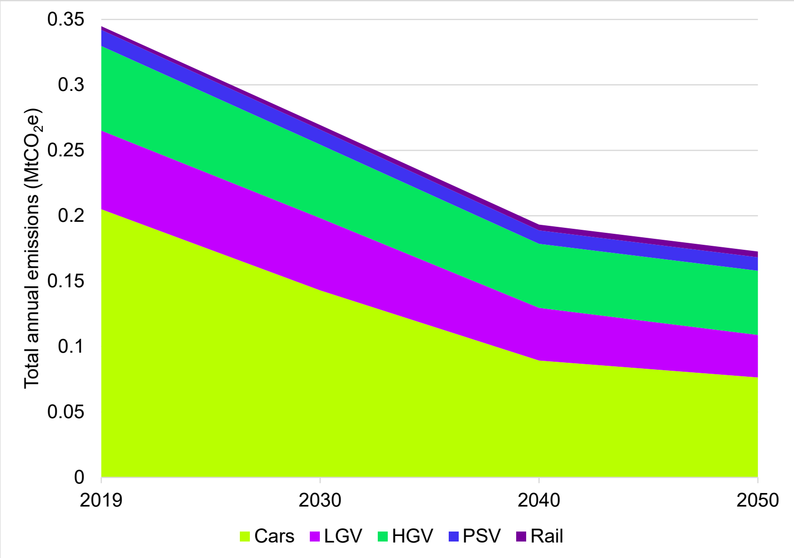

Figure 15: Emissions by vehicle type, BAU, by year ($MtCO_2e$ p.a.) (Source: Midlands Connect Dashboard)

Overall, emissions are projected to reduce markedly over the time period as the forecast electrification of the fleet is expected to offset anticipated traffic growth. By 2050, total emissions are projected to be 50% lower than 2019 levels. The emissions reduction from 2019 would be even larger in the other Midlands Connect scenarios which have more ambitious views on ZEV uptake by 2050 (with a 90% reduction in the local Localised ZEV uptake scenario and over 95% reduction in the Accelerated ZEV uptake scenario, as shown in Figure 3-4).

As the rate of uptake of ZEVs is projected to vary between light and heavy vehicles, the **balance of emissions between vehicle types is forecast to change though time**. In the BAU scenario shown,[45] car and van fleets are assumed to increasingly convert to electric vehicles, but the HGV fleet is assumed to remain fully diesel throughout. As a result, by 2050 cars are projected to account for only 44% of emissions, compared to 59% in 2019. For LGVs above average rates of traffic growth are projected to balance uptake of ZEVs so they account for 19% of projected emissions in 2050 (similar to the 2019 proportion of 17%). The lack of decarbonisation of the HGV fleet means that they are projected to account for 28% of emissions in 2050 (compared to 19% in 2019). Public transport is estimated to account for 8% of emissions by 2050 (compared to 5% in 2019).

5.3 Emissions by road type

Figure 16 shows emissions from road traffic by road type by year in the BAU scenario outlined in *Baseline and projected transport sector emissions in Telford and Wrekin (page 18)*.

[45] The Midlands Connect Dashboard does not provide projections through time by vehicle type for the other scenarios

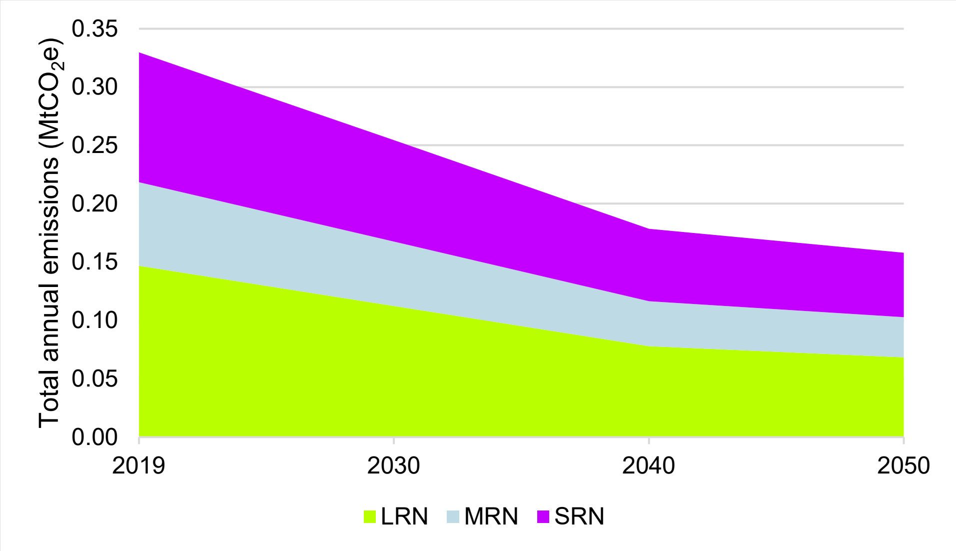

Figure 16: Emissions by road type, BAU (Mt CO_2e p.a.) (Source: Midlands Connect Dashboard)

The figure shows that **emissions on the local road network (LRN) are the largest component of road emissions in Telford and Wrekin, accounting for approximately 45% of the total**. The strategic road network (SRN) accounts for just over a third of emissions and the major road network (MRN) for just over 20%. This balance between road types is expected to remain broadly unchanged across the forecast years.

5.4 Emissions by trip type

Emissions by trip length

Figure 17 shows a breakdown of road emissions within Telford and Wrekin according to the distance band of the overall length of the journeys generating the emissions (including any element of the trip that occurs outside of the authority in the trip length definition but not in the emissions total shown).

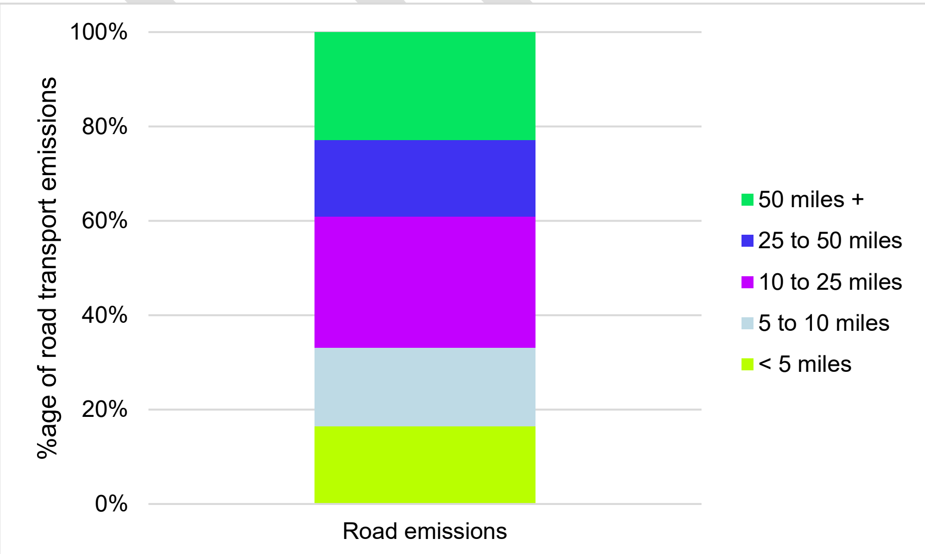

Figure 17: Road emissions by distance band, 2019 (Source: Midlands Connect Dashboard)

The figure shows that trips **over 10 miles long account for the majority of emissions**, over 65% of emissions from road vehicles (excluding buses). Even though longer trips account for a relatively small proportion of trips made, particularly for cars, their length leads to a significant contribution to emissions, even accounting only for the portion of trips within the limits of Telford and Wrekin's boundaries.

The significance of the contribution of longer trips to emissions is even greater if emissions from the full trip length are considered (including emissions outside the authority boundary). Previous baseline analysis using the Telford Strategic Transport Model (TSTM) considered emissions for the full trip length of trips starting and ending within the Telford and Wrekin boundary (but excluding through trips) by distance band, as summarised in Figure 18.

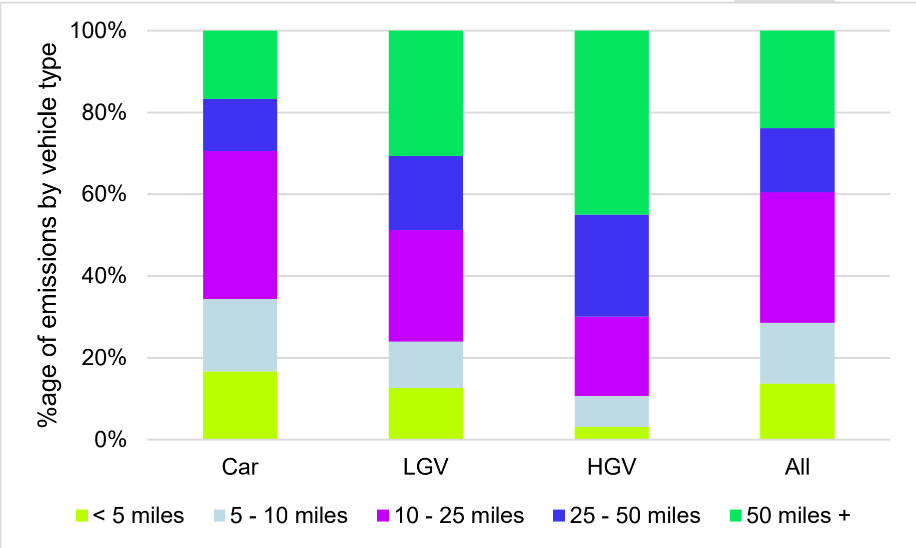

Figure 18: Road emissions by vehicle type and distance band, 2019 (Source: TSTM analysis)

Trips over 10 miles long are estimated to account for over 70% of total emissions for trips into, out of or within the authority. The figure also shows that the balance of emissions by trip length varies considerably by vehicle type. For HGVs nearly 90% of emissions are estimated to be generated on trips over 10 miles long, for LGVs over 75% and for cars just over 65%.

Figure 19 uses national data to highlight the relatively low proportion of total trips that longer trips represent. It shows English car trip numbers and distance travelled by car (a proxy for emissions generated) by distance band for 2019 from the National Travel Survey.[46]

[46] DfT (2025) National Travel Survey, 2024. Table NTS0308 Average number of trips and distance travelled by trip length and main mode, England. Available at: [Transport Statistics Finder: interactive dashboard](). 2019 data is presented for consistency with the Midlands Connect Dashboard baseline data. However, the 2024 NTS data shows a consistent balance between trips and distance by distance band

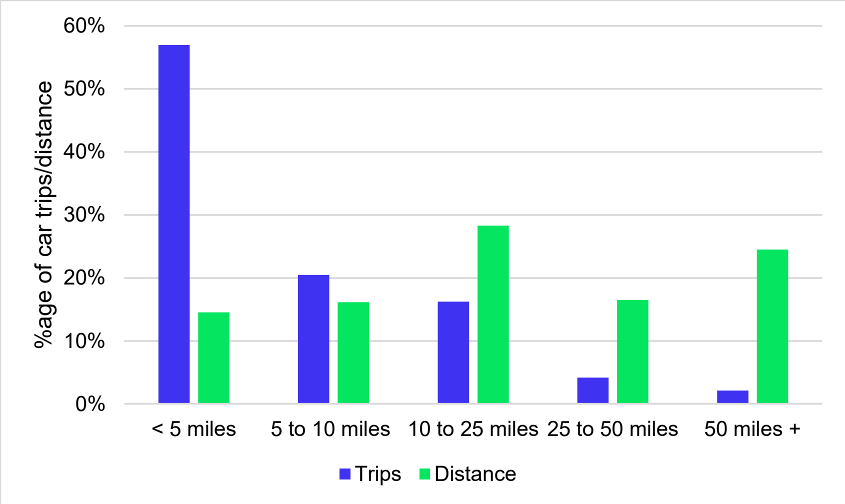

Figure 19: National car trips and distance by distance band, 2019 (Source: National Travel Survey)

Trips over 10 miles account for 69% of distance travelled (or emissions) but less than 25% of car trips. The longest 6% of trips over 25 miles long account for over 40% of distance travelled (or emissions). In contrast, **the 57% of trips that are less than 5 miles long account for less than 15% of distance travelled (and emissions).**

The balance of emissions by distance band also varies by journey purpose. Figure 20 illustrates the breakdown of road emissions within Telford and Wrekin by distance band for the three journey purposes shown in the Midlands Connect Dashboard: business, commuting and other.

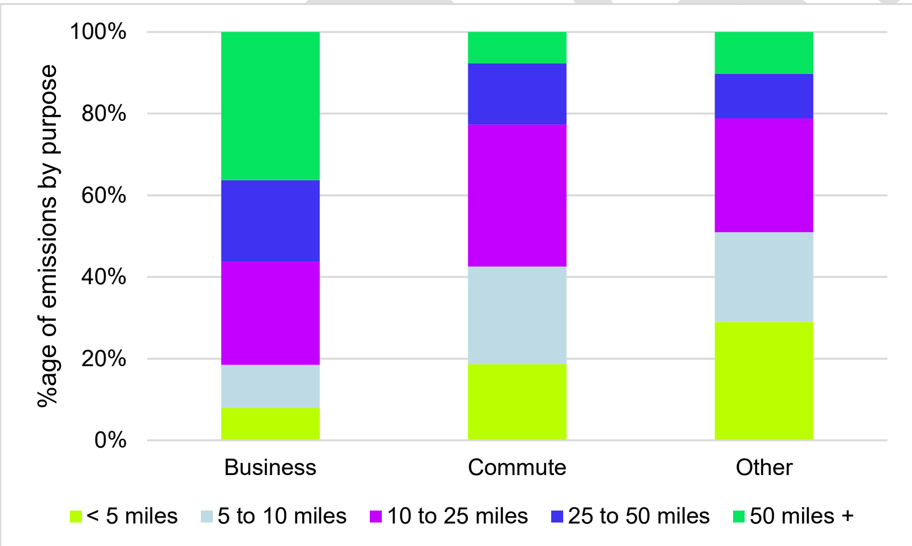

Figure 20: Road emissions by distance band by journey purpose (Source: Midlands Connect Dashboard)

The figures indicate that shorter trips contribute a more significant proportion of emissions for commuting and other trips than business trips. Trips under 5 miles long account for nearly 20% of commuting emissions and nearly 30% of other emissions but less than 10% of business emissions. In contrast, trips over 25 miles account for over 55% of business emissions but only 20% to 25% of emissions from commuting trips and trips for other purposes. Further detail on the relative balance of emissions between purposes is provided in the next section.

For context in considering the potential of different measures to reduce emissions, Figure 21 provides a summary of national average trip length by mode from NTS data.

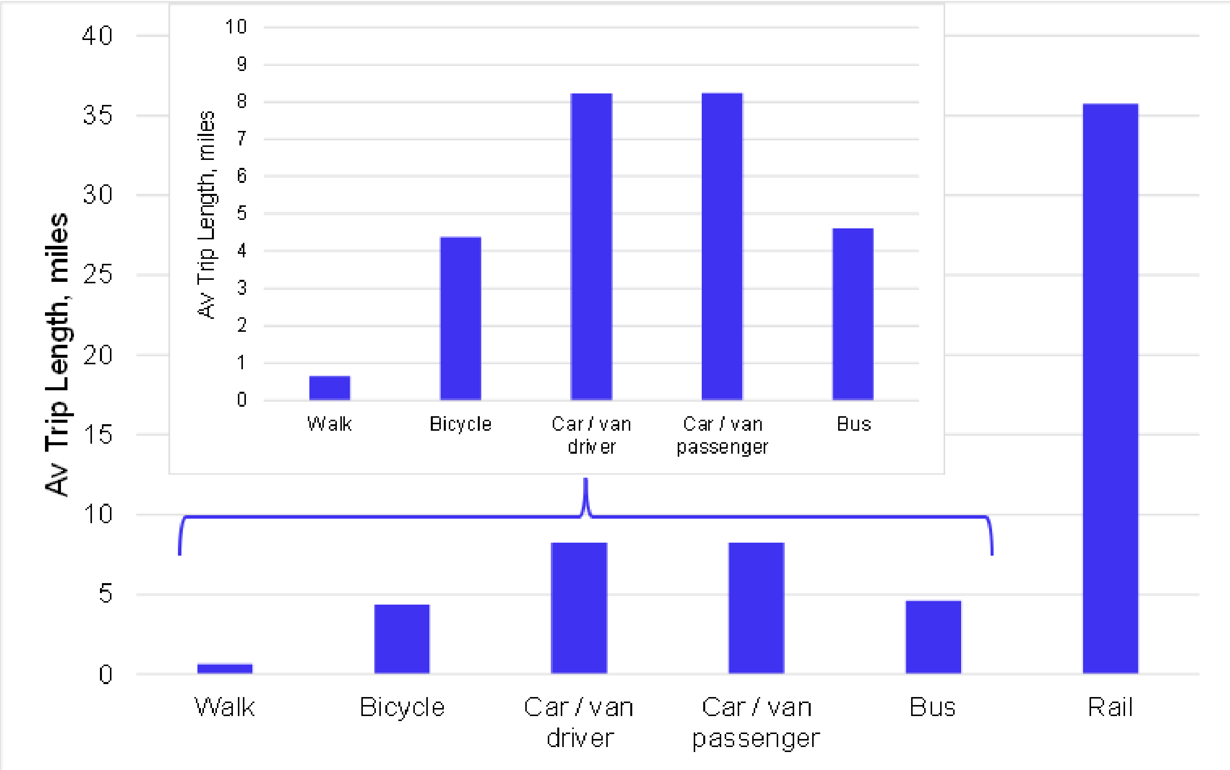

Figure 21: Average trip length by mode, 2019[47] (Source: NTS)

The figures highlight that rail has the most potential to serve trips of the length that contribute most to carbon emissions (with an average trip length of over 35 miles). Current average bus trip lengths are relatively low (under 5 miles) but have the potential to increase if services meet travel requirements for longer journeys. Cycling has the potential to provide an alternative mode of transport for journeys up to 5 miles in length and more, particularly if affected trip lengths can be extended by the use of e-bikes and provision of improved cycling facilities at rail stations to encourage combined mode journeys.

Emissions by trip purpose

Figure 22 provides a summary of the breakdown of road carbon emissions in Telford and Wrekin by purpose.

[47] Derived from DfT (2020), National Travel Survey 2019 - data for the West Midlands region, NTS9910. Available at: National Travel Survey: 2019 - GOV.UK

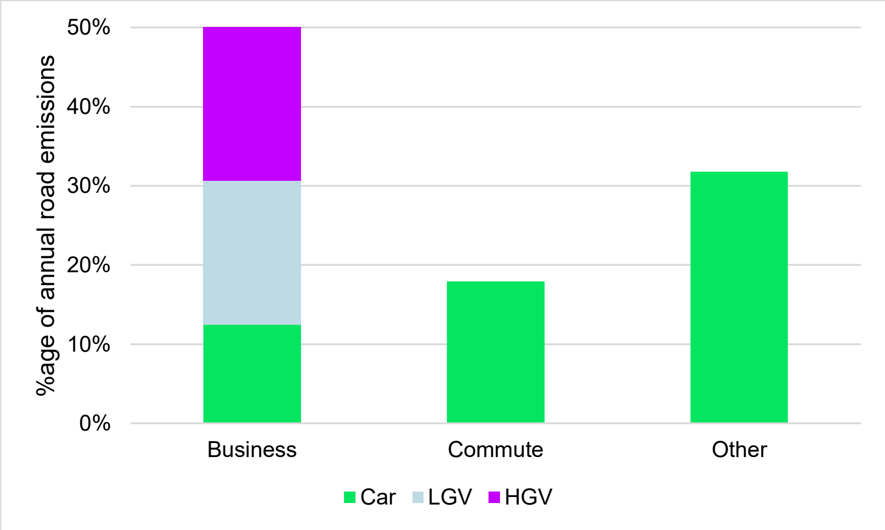

Figure 22: Road emissions by vehicle type and purpose, 2019 (Source: MC Dashboard)

Trips for business purposes, including all HGV and LGV travel, are estimated to account for half of road emissions. Less than 25% of emissions from business trips are generated by car trips. These business trips represent approximately 20% of total car emissions. Commuting accounts for 29% of car emissions and trips for other purposes account for the remaining 51% of car emissions.

Figure 23 presents national data to provide an indication of how emissions from car trips for 'other purposes' break down between more detailed purposes. The data uses car travel distance as a proxy for emissions and represents emissions from full trip lengths (unlike Figure 22 which presented emissions for the portion of trips within Telford and Wrekin only). Data is presented for 2019 for consistency with the Midlands Connect Dashboard and for 2024 (the latest year available in NTS) to illustrate the impact of recent changes in travel patterns, particularly since COVID.

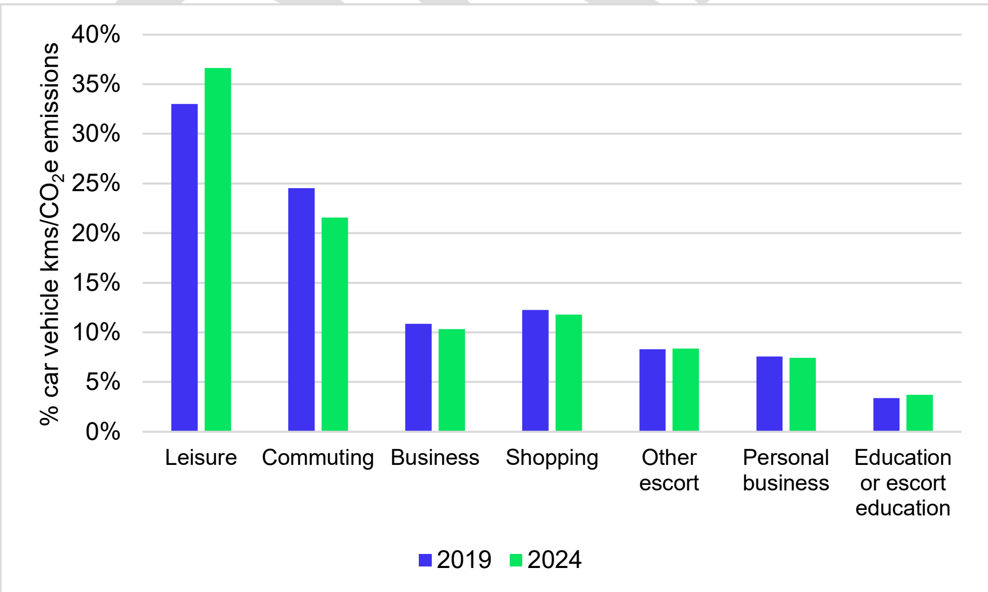

Figure 23: Car vehicle kilometres by purpose, 2019 and 2024 (Source: NTS)[48]

[48] Derived from national average data for car drivers from DfT (2025) National Travel Survey 2024, Table NTS0409. Available at: nts0409.ods

Of the purposes shown, leisure (including entertainment and holiday and visiting friends and family) accounts for the largest single proportion of car distance travelled at approximately 35%. Commuting accounts for the second highest proportion at 20% to 25%. Shopping and business each account for 10% to 12%, business trips for 10% and personal business (such as medical appointments) and trips escorting others each account for about 8%. Education trips by car account for less than 4% of total distance travelled.

The average distance travelled by car driver has reduced by approaching 10% between 2019 and 2024 according to the NTS statistics. However, the disaggregation of distance travelled between purposes has stayed broadly consistent. The main difference is that business and commuting travel combined account for 4% less of the distance travelled than in 2019 and leisure travel accounts for 4% more.

Figure 24 summarises the average car trip length for the NTS purposes.

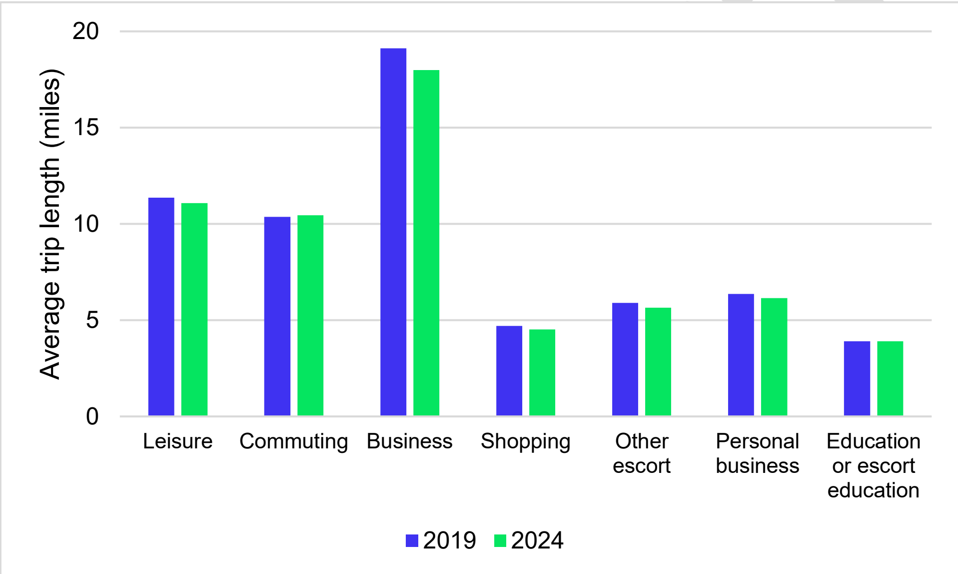

Figure 24: Average car trip length by purpose, 2019 and 2024 (Source: NTS) [49]

The results by purpose highlight that **total emissions contributions from each purpose are the result of the combination of average trip length and relative number of trips for each purpose**. For instance, the average trip length for business trips is nearly 70% longer than the length of any of the other purposes (at over 18 miles) and the trips therefore contribute to over 10% of emissions despite accounting for less than 5% of trips being made. In contrast, education trips account for over 7% of trips but less than 4% of emissions due to their short average trip length (less than 4 miles).

5.5 Car emissions by population segment

Car emissions totals are influenced by the characteristics of the population living in Telford and Wrekin which affect levels of car use. Figure 25 summarises average emissions generated in 2019 from car travel (for all purposes) per resident for the 18 ONS population segments identified within Telford and Wrekin, using data and segment labels from the Centre for Research into Energy Demand Solutions (CREDS) place based carbon

[49] ibid

calculator.[50] The bar heights show the average annual emissions from car travel generated per person in each segment and the green dotted line shows the average across the total borough population.

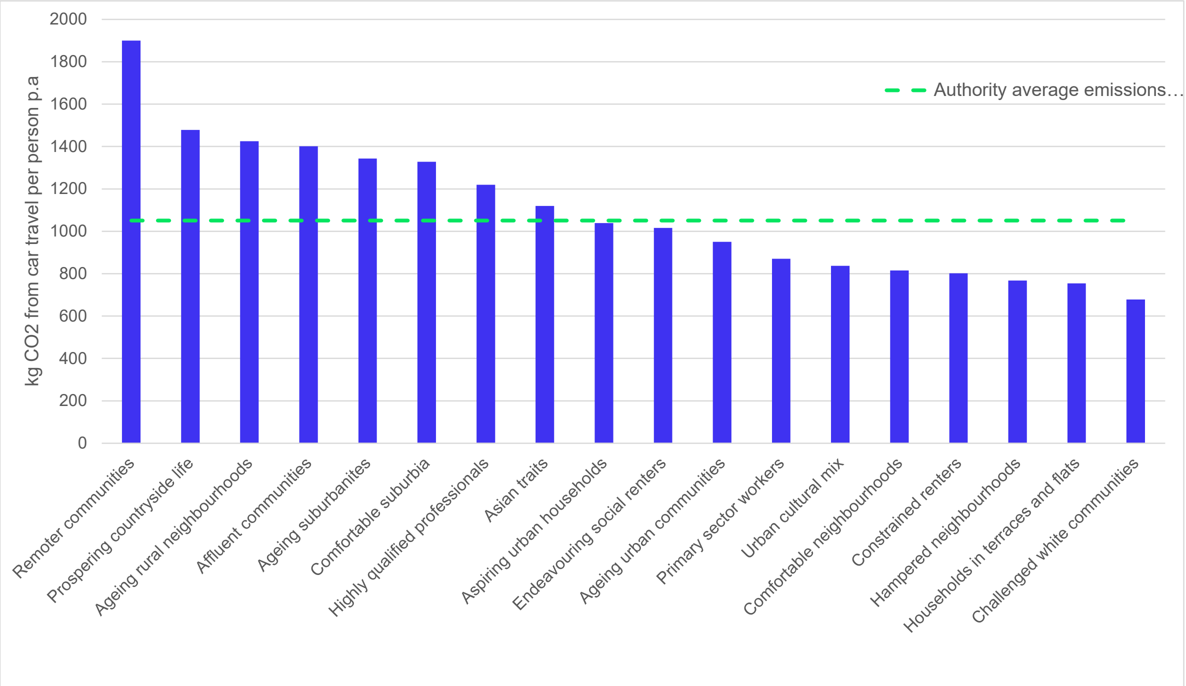

Figure 25: Average CO_2 emissions from car travel p.a. per person by ONS population segments[51] (Source: CREDS)

The variation in emissions between the most emitting of the population segments and the least emitting is significant. **Emissions per resident tend to be higher in more remote, rural locations and where residents have above average incomes**. In contrast, those living in urban areas and those with lower incomes tend to generate fewer emissions through car travel.

For instance, annual emissions generated by car use per resident in the highest emitting segment, ‘remoter communities’, are at least two and half times greater than the emissions generated by residents in the least emitting segments, ‘hampered neighbourhoods’, ‘households in terraces and flats’ and ‘challenged white communities’ and more than 80% greater than the authority average emissions per person. The ‘remoter communities’ segment accounts for only 1% of the authority’s emissions. However, a similar pattern is seen with the two next highest emitting population segments. ‘Prospering countryside life’ and ‘aging rural neighbourhoods’ segments are also in rural areas and between them account for nearly 15% of the authority’s emissions and have average emissions per person that are 35% to 40% higher than the authority average and nearly double those of the least emitting segments.

[50] Analysis based on the CREDS carbon calculator (Place-based carbon calculator). Source: Morgan, Malcolm, Anable, Jillian, & Lucas, Karen. (2021). A place-based carbon calculator for England. Presented at the 29th Annual GIS Research UK Conference (GISRUK), Cardiff, Wales, UK (Online): Zenodo. A place-based carbon calculator for England | Zenodo) and represents all car travel by the borough’s residents for all purposes, whether in Telford & Wrekin or beyond the borough boundaries.
[51] ibid

To illustrate how the variation in emissions by population segment applies across Telford and Wrekin, Figure 26 shows the emissions generated from car travel per resident in each LSOA in the borough, derived from the CREDS data.[52]

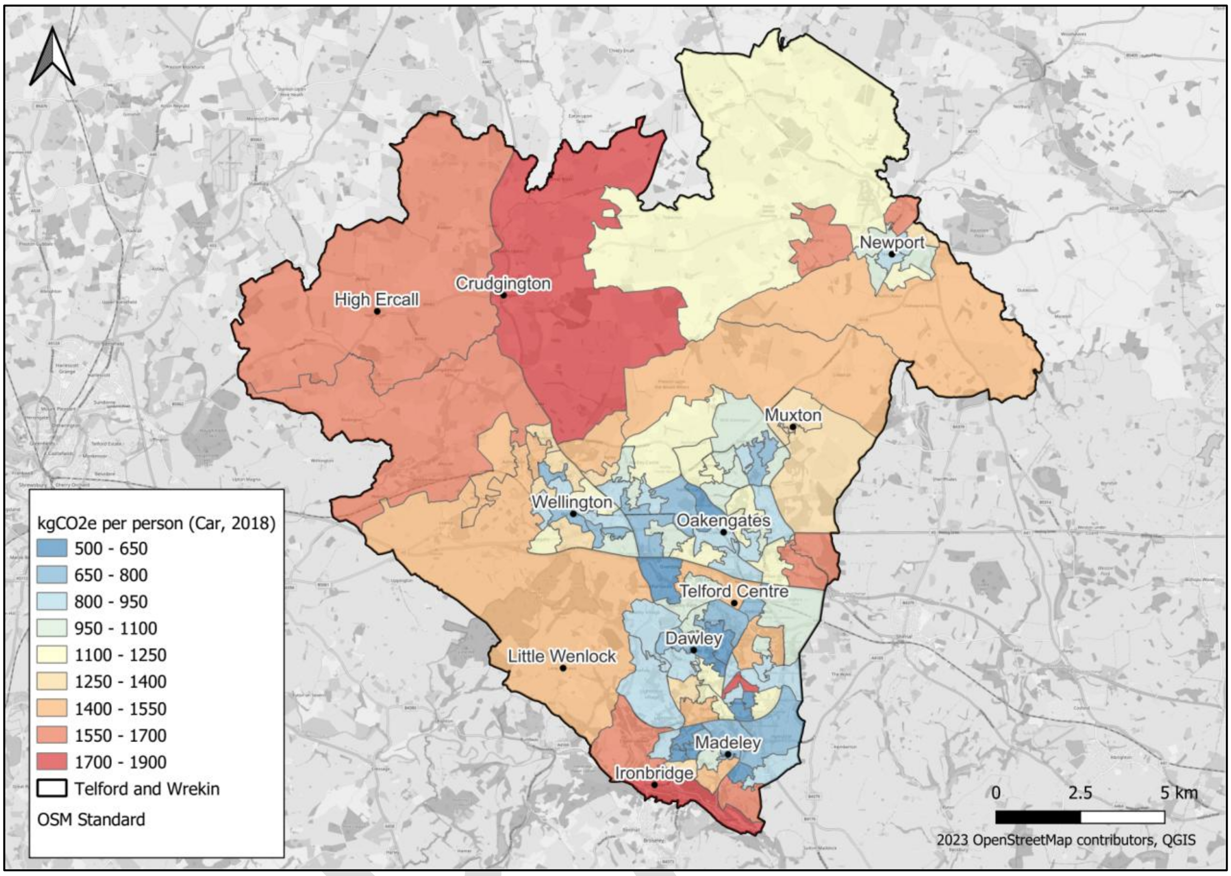

Figure 26: Emissions generated car travel per person by LSOA - $KgCO_2e$ per person per year. Source: CREDS place based carbon calculator

The data illustrates how residents in LSOAs in the urban, more densely populated areas of Telford and Wrekin individually generate the lowest emissions through car travel of residents across the borough. LSOAs with lower average emissions of between 500 and 950 $kgCO_2$ per resident per year include Madeley, Dawley, Oakengates, Lawley, and areas of Wellington.

Residents in more rural LSOAs generally generate higher emissions through car travel, including those in the wards of Wrockwardine, Ironbridge Gorge, Ercall Magna, Edgmond, and Church Aston and Lilleshall. The LSOAs within which Ironbridge and Crudgington are located are amongst the top three LSOAs within Telford and Wrekin in terms of average emissions generated from car travel per resident, generating between 1,700 and 1,900 $kgCO_2$ per resident per year (up to triple the levels generated by residents in the least carbon intensive LSOAs).

These variations in emissions generated from car travel by populations in different areas across the borough contribute to the geographical distribution of emissions seen, as discussed further in the next section.

52 ibid

5.6 Key considerations for the TWTP

The review of the source of transport emissions in Telford and Wrekin in this section has highlighted the following key considerations for the development of the TWTP:

- **Decarbonisation measures would need to take account of Telford and Wrekin's characteristics and the distribution of emissions between sources**. Measures would particularly need to account for:
  - **The balance of emissions between vehicle types**. In 2019: 59% of emissions within the borough were generated by car trips, 19% by HGVs, 17% by LGVs and 5% by public transport.
  - **The importance of long trips**. Over 65% of road emissions within Telford and Wrekin in 2019 were generated by trips over 10 miles long. Short trips generate limited emissions (e.g. NTS figures show car trips under 5 miles account for more than 55% of trips but less than 15% of emissions).
  - **The importance of travel for business purposes**, accounting for 50% of road emissions in Telford and Wrekin across all vehicle types. For car trips, leisure travel generates the most emissions (35%).
  - **The difference in emissions from car use between different population segments** e.g. more rural and prosperous groups can generate over double the emissions generated by more urban, lower income groups.
- **A wide range of decarbonisation measures would be needed to respond to the range of emissions sources**. For instance, active travel measures are most suited to relatively short urban trips and public transport measures for mid/long distance movements with significant trip numbers.
- **Different stakeholders will have varying potential to influence different elements of emissions**. For instance, Telford & Wrekin Council and local stakeholders will have limited influence over trips on the Strategic Road Network, rail network or over freight trips which are largely influenced by commercial decision making, particularly those to and from distribution centres where trips are determined by decisions made by companies located elsewhere.

6. Geographical distribution of emissions

Key points on geographical distribution of emissions

Local data (from the Midlands Connect Emissions Baseline Dashboard and Telford Strategic Transport Model, TSTM) provide a number of insights into the geographical distribution of emissions in Telford and Wrekin, helping to understand potential areas of focus for decarbonisation measures. Key points include:

- The ‘Urban Large’ area around Telford accounts for approximately one third of the authority’s area but most of the population, economic activity and trip making. Trips from the area generate an estimated 80% of the ‘in borough’ road transport emissions from trips originating in the borough and trips to the area generate an estimated 85% of emissions from trips ending in the borough.
- TSTM sector analysis highlights that emissions generated by travel to and from each sector in Telford and Wrekin reflect the combination of trip numbers (reflecting density of population and/or economic activity) and average trip lengths. Trips to and from the central Telford and Wrekin sector account for the highest proportion of emissions due to the density of population and activity in the central area.
- Nearly 35% of overall road emissions within the borough boundary are generated by through traffic. Inbound and outbound trips account for nearly 40% of emissions (considering only the portion of the trips within the borough boundaries). Trips wholly within the borough account for just under 30% of emissions. The balance between trip types varies significantly by vehicle type with through trips accounting for a lower proportion of car emissions and a higher proportion of goods vehicle emissions.
- Trips to and from Shropshire and the wider West Midlands account for over 70% of vehicle kilometres on inbound and outbound car trips.
- At a sector to sector movement level, the most carbon intensive movements either start or end in central Telford and Wrekin. However, each individual movement only accounts for only a small proportion of total vehicle kilometres and emissions.
- Although dispersed, emissions on less busy movements, from rural areas and on more minor roads, sum to a significant proportion of the total.

A **wide range of decarbonisation measures** would be needed to respond to the range of emissions sources identified and the varying trip characteristics. Measures would also need to reflect the **varying level of influence that different stakeholders will have on different element of emissions**. For instance, Telford & Wrekin Council and local stakeholders will have most influence on internal car trips and (working with neighbouring authorities) on inbound and outbound car trips. Their influence is likely to be least strong for freight emissions and through trips.

6.1 Overview

This section builds on *Transport emissions by source (page 27)* to provide further insight into the types and locations of the trips generating emissions. The aim is to provide further understanding of where measures to decarbonise Telford and Wrekin's transport sector would be best targeted to contribute to closing the emissions gap.

The analysis considers:

- Emissions by trip origin or destination
  - Emissions by Playbook area type.
  - Hotspot origins and destinations for car and goods vehicle trips, identified using TSTM model analysis.
- Emissions by movement type
  - The balance of emissions between trips starting and/or ending within Telford and Wrekin borough boundaries and those passing through.
  - The most carbon intensive sector to sector car movements, based on TSTM model areas.

6.2 Emissions by trip origin or destination

Emissions by Playbook area type

The Carbon Assessment Playbook categorises the country into nine different area types (based on the area types used in the DfT's National Trip End Model). Figure 27 shows that areas of Telford and Wrekin are classified into four of the Playbook area types.

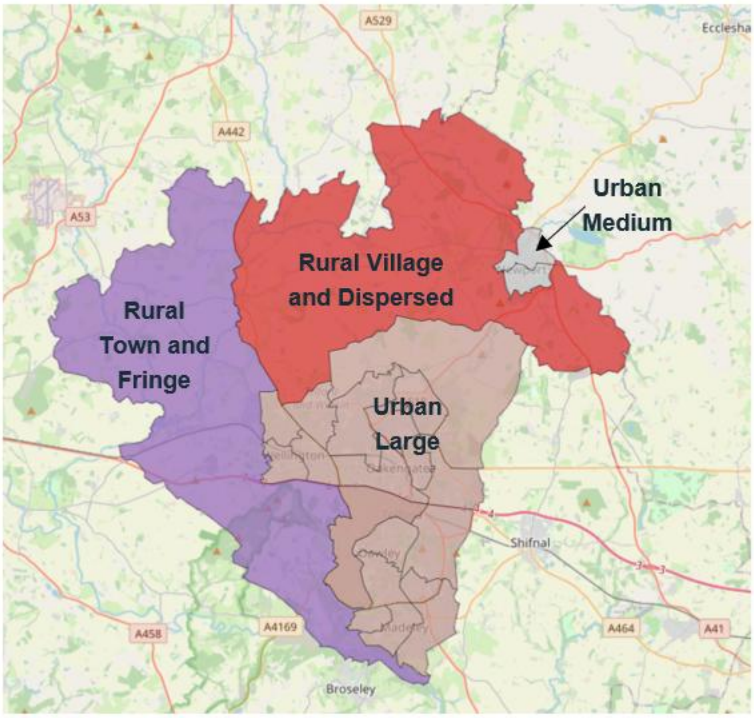

Figure 27: Playbook area types in Telford and Wrekin

About two thirds of the area of the borough is split evenly between the two rural area types of 'Rural Village and Dispersed' and 'Rural Town and Fringe'. Most of the remaining area is classified as 'Urban Large' (focused around Telford) to the south and east with a small area of 'Urban Medium' around Newport to the north east.

Figure 28 shows the proportion of total emissions generated by trips starting and ending in Telford and Wrekin (including only the proportion of trips within the borough) associated with each area type.

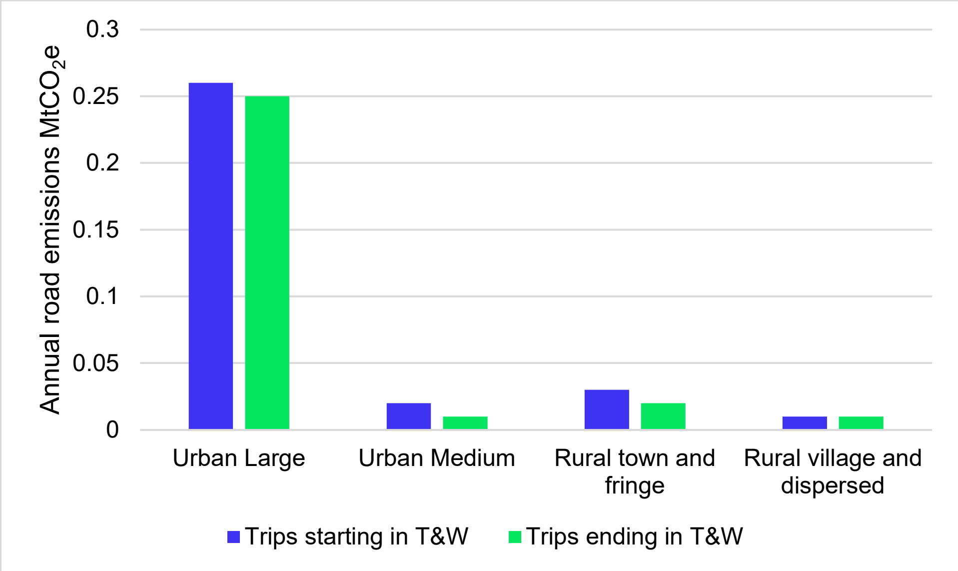

Figure 28: Emissions from trips starting and ending in Telford and Wrekin by area type, 2019, $MtCO_2e$ (Source: Midlands Connect Dashboard)

The figure shows that, despite accounting for only approximately one third of the authority's area, the **Urban Large area accounts for the majority of transport emissions**. This reflects the fact that it accounts for most of the population, economic activity and trip making. Overall trips from the area account for over 80% of the road emissions from trips starting in Telford and Wrekin, with Urban Medium accounting for just over 5% and the Rural areas accounting for nearly 15% of emissions.

The pattern is similar for trips ending in each area type, although emissions are even more focussed on trips to the Urban Large area (accounting for over 85% of emissions from trips into Telford and Wrekin).

Sector based hotspot origins and destinations

Data from the Telford Strategic Traffic Model (TSTM) provides a more detailed overview of emissions origin and destination hotspots within Telford and Wrekin, i.e. the locations responsible for generating the highest levels of emissions from trips to, from and within the borough. The model data enables analysis of vehicle kilometres and therefore emissions generated by trips to and from 12 sectors within Telford and Wrekin (with vehicle kilometres taken as a proxy for emissions).[53]

The analysis focuses particularly on emissions from car travel, as this is the subset of emissions over which Telford & Wrekin Council will have most influence. A summary of the destination TSTM sectors for goods vehicle movements generating the highest levels emissions is also presented for comparison.

[53] In the interests of proportionality for this analysis, car emissions are assumed to be directly dependent on vehicle kilometres (i.e. a standard emissions rate per vehicle kilometre for all vehicle kilometres). In practice emissions rates will vary to an extent as a result of driving conditions, particularly speed. However, impacts will be minor and would not influence the key messages drawn from the maps.

Overview of analysis

To support the analysis of emission hotspots, the borough and wider modelled area have been split into a series of geographical sectors. Figure 29 illustrates the system of 12 sectors identified to represent Telford and Wrekin on the basis of key travel characteristics and area types in the borough. Each of the four Playbook area types shown in Figure 27 comprises one or more of the sectors shown.[54] Table 1 provides an overview of the sector locations and their descriptions. In the following sections, sectors are referred to by their number and name from the table. Details of the seventeen sectors covering the rest of the country are provided in Appendix B.

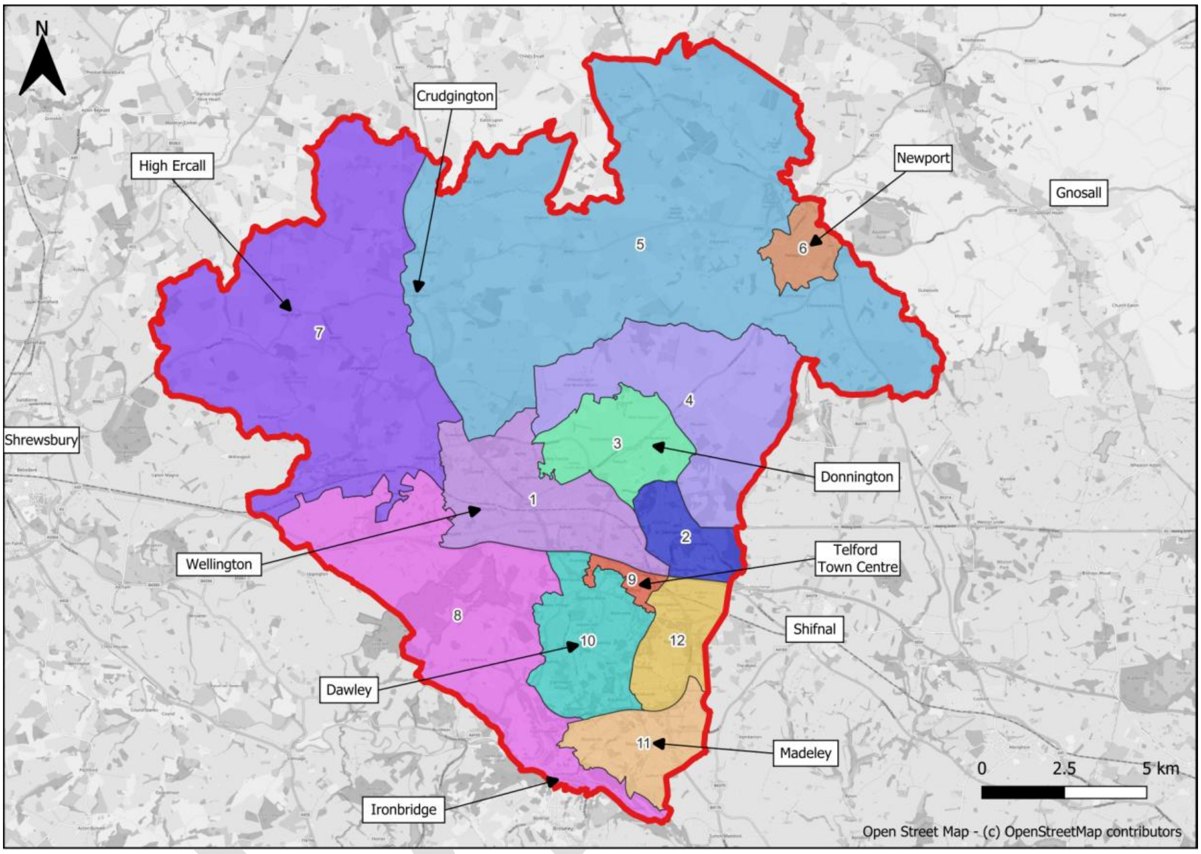

Figure 29: Telford and Wrekin borough sectors

Sector number	Sector name
1	Central Telford & Wrekin (Oakengates, Ketley, Wellington, Hadley)
2	St. Georges & Priorslee
3	Donnington & Trench
4	Muxton & Lilleshall
5	North East Telford & Wrekin (Crudgington, Edgmond, Chetwynd Aston)
6	Newport
7	North West Telford & Wrekin (High Ercall, Longdon-upon-Tern, Admaston)
8	South West Telford & Wrekin (Ironbridge, Coalport, Little Wenlock & Leaton)
9	Telford Town Centre

[54] Urban Medium = Sector 6, Rural village and dispersed = Sector 5, Rural town and fringe = Sectors 7 and 8 and Urban large = Sectors 1,2,3,4,9,10,11,12

Sector number	Sector name
10	Dawley, Lawley, Lightmoor
11	Madeley & Halesfield
12	Hollinswood, Randlay, Stirchley & Brookside

Table 1: Telford and Wrekin borough sectors

Figure 30 and Figure 31 below show car vehicle kilometres generated by trips starting within each of the 12 geographical sectors in Telford and Wrekin. Figure 32 and Figure 33 provide the equivalent maps for trips ending in each of the sectors in the borough.

The vehicle kilometres presented relate to the morning peak movements to/from or within the borough. This time period has been chosen to provide a snapshot of the time at which traffic volumes are typically at their highest and to provide an understanding of which movements are associated with residents and visitors to an area (following the broad assumption that residents will tend to be leaving a home area and arriving at a destination area in the morning). Vehicle kilometres account for full trip lengths, not just the portions within Telford and Wrekin's borough boundaries.[55]

Car vehicle kilometres by origin

Figure 30 provides an overview of the vehicle kilometres generated by car trips starting in each sector, with the darkest shades highlighting higher levels of vehicle kilometres (and therefore emissions generated). The figures represent total vehicle kilometres from each sector and are therefore influenced by the sizes of the sectors. Large sectors can therefore show relatively high levels of vehicle kilometres due to the area covered. For comparison, Figure 31 shows the car vehicle kilometres generated per square kilometre (km^2) of area for each sector to account for the varying sector sizes.

[55] The vehicle kilometres reflect the trips represented in the TSTM. They do not include traffic on local, unmodelled roads which adds approximately 35% to total vehicle kilometres. These kilometres are likely to be mainly short local journeys, or the last leg of journeys already captured within the model.

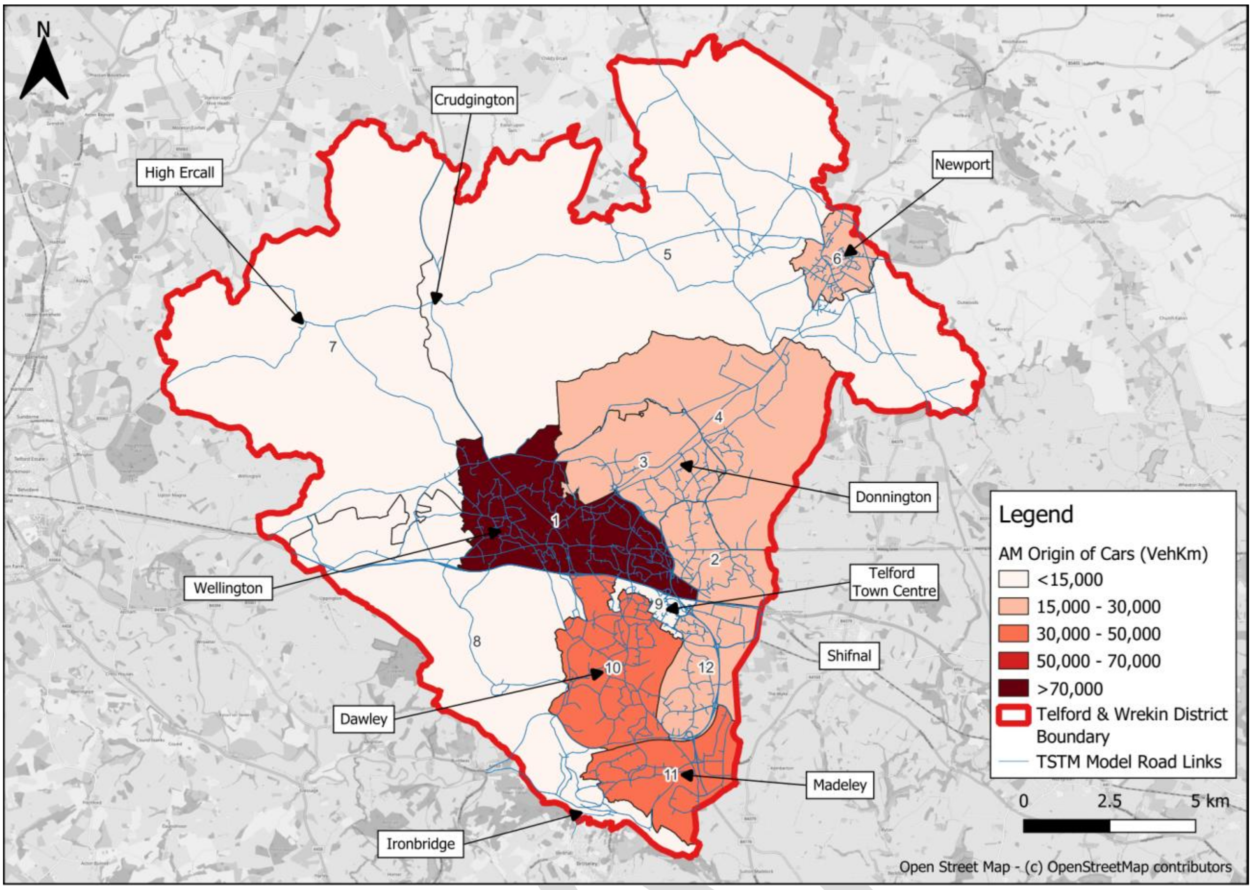

Figure 30: Morning peak car vehicle kilometres for trips starting in Telford and Wrekin by origin sector (Source: TSTM analysis)

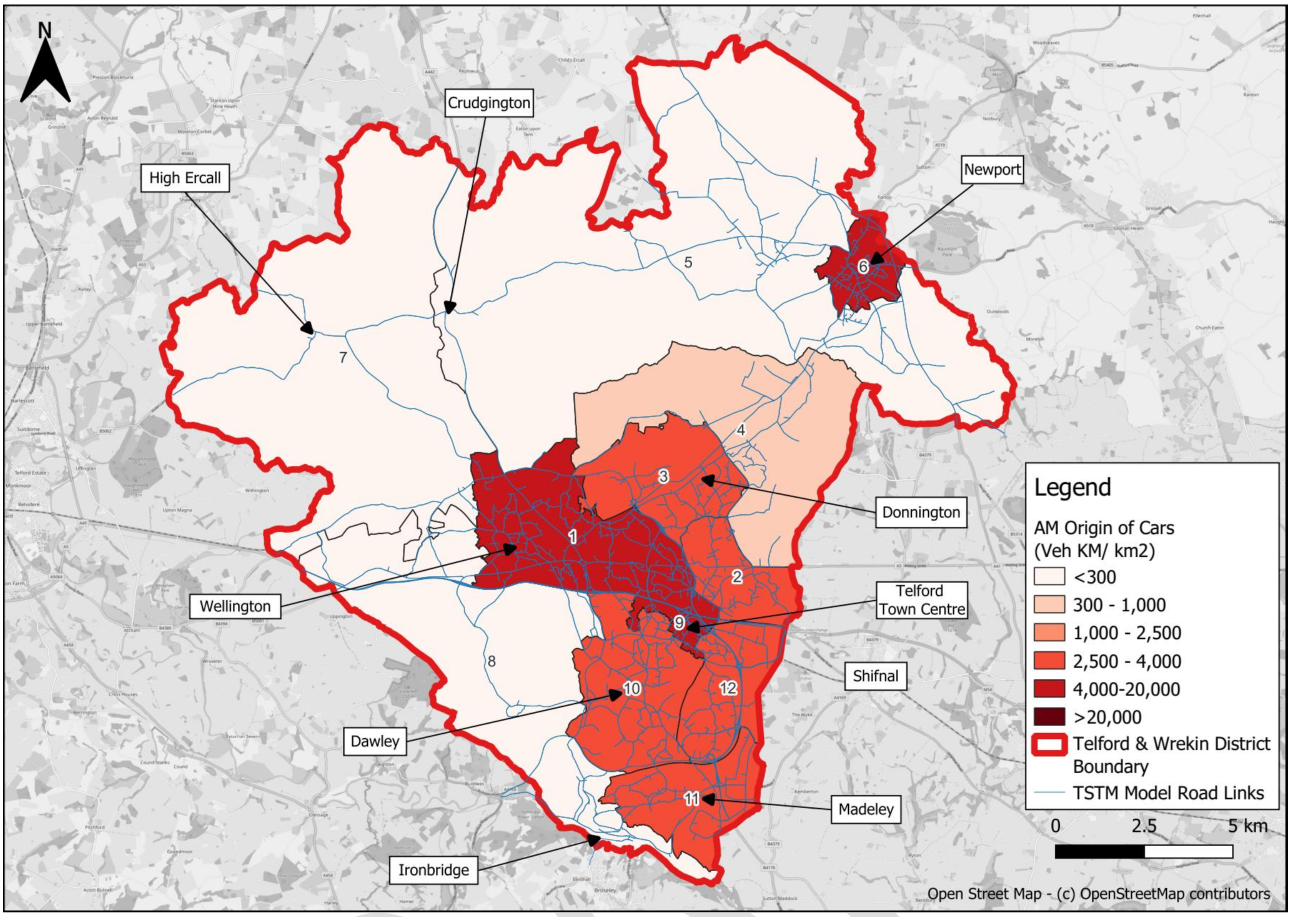

Figure 31: Morning peak car vehicle kilometres for trips starting in Telford and Wrekin per km² by origin sector (Source: TSTM analysis)

Total vehicle kilometres generated by trips originating in each sector reflect the combination of trip numbers and average lengths for the trips. Average trip lengths for trips from the 12 sectors vary from below 10 km (Sectors 2 and 9) to just under 20 km (Sectors 5 and 7).

Overall, Figure 30 and Figure 31 show that the **main driver of car vehicle kilometres originating from sectors is population density and size**. Consistent with Figure 28, the majority of car vehicle kilometres originate in the sectors in the Urban Large area. Trips originating in Sector 1 Central Telford and Wrekin (Oakengates, Ketley, Wellington, Hadley) generate the largest number of car vehicle kilometres in total and per square kilometre of sector area. This reflects the large, dense population in this sector making outbound trips in the morning peak, combined with average trip lengths of about 10 km.

Trips originating in Sector 10 (Dawley, Lawley, Lightmoor) and Sector 11 (Madeley and Halesfield) also generate a large volume of car vehicle kilometres and therefore car emissions in the morning peak, both in total and per square kilometre of sector area. This reflects relatively large, dense populations in these sectors making outbound trips in the morning peak. Average trip lengths for Sector 10 are also about 10 km, those for Sector 11 are slightly higher at approximately 13 km.

Trips originating in Sector 9 (Telford Town Centre) generate the second lowest level of total car vehicle kilometres across all sectors (falling in the lowest category mapped). However, when vehicle kilometres per square kilometre are considered, the sector moves into the second highest category on the map. This reflects the dense population in the sector leading to a relatively large population in a relatively small sector area which generates a large number of trips and vehicle kilometres, despite average trip length being relatively low (less than 10 km).

Consistent with Figure 28, trips originating in the large rural sectors within Telford and Wrekin (sector numbers 5, 7, and 8) generate the lowest values both in terms of total car vehicle kilometres and vehicle kilometres per square kilometre of sector area. This reflects the low population densities in these more rural areas leading to low total populations generating low trip numbers. This means that total vehicle kilometres remain low, even though trip lengths are above average (at 15 km to 20 km) and vehicle kilometres and therefore emissions per person are above average (as shown in Figure 26).

Car vehicle kilometres by destination

Figure 32 and Figure 33 show total vehicle kilometres and vehicle kilometres per square kilometre generated by car trips ending in each sector in Telford and Wrekin in the morning peak. Again, the darkest shades highlight higher levels of car vehicle kilometres and therefore emissions.

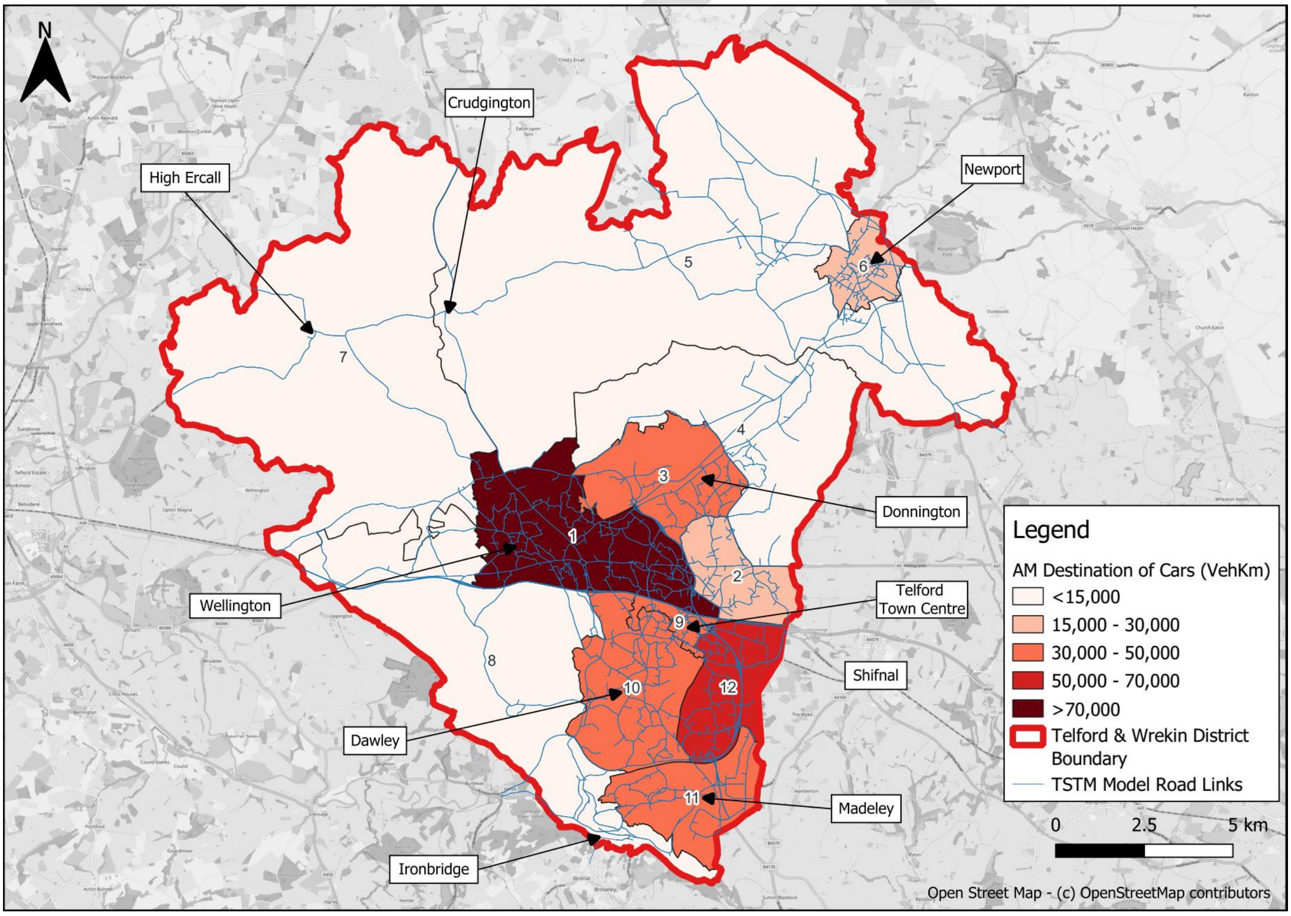

Figure 32: Morning peak car vehicle kilometres for trips ending in Telford and Wrekin by destination sector (Source: TSTM analysis)

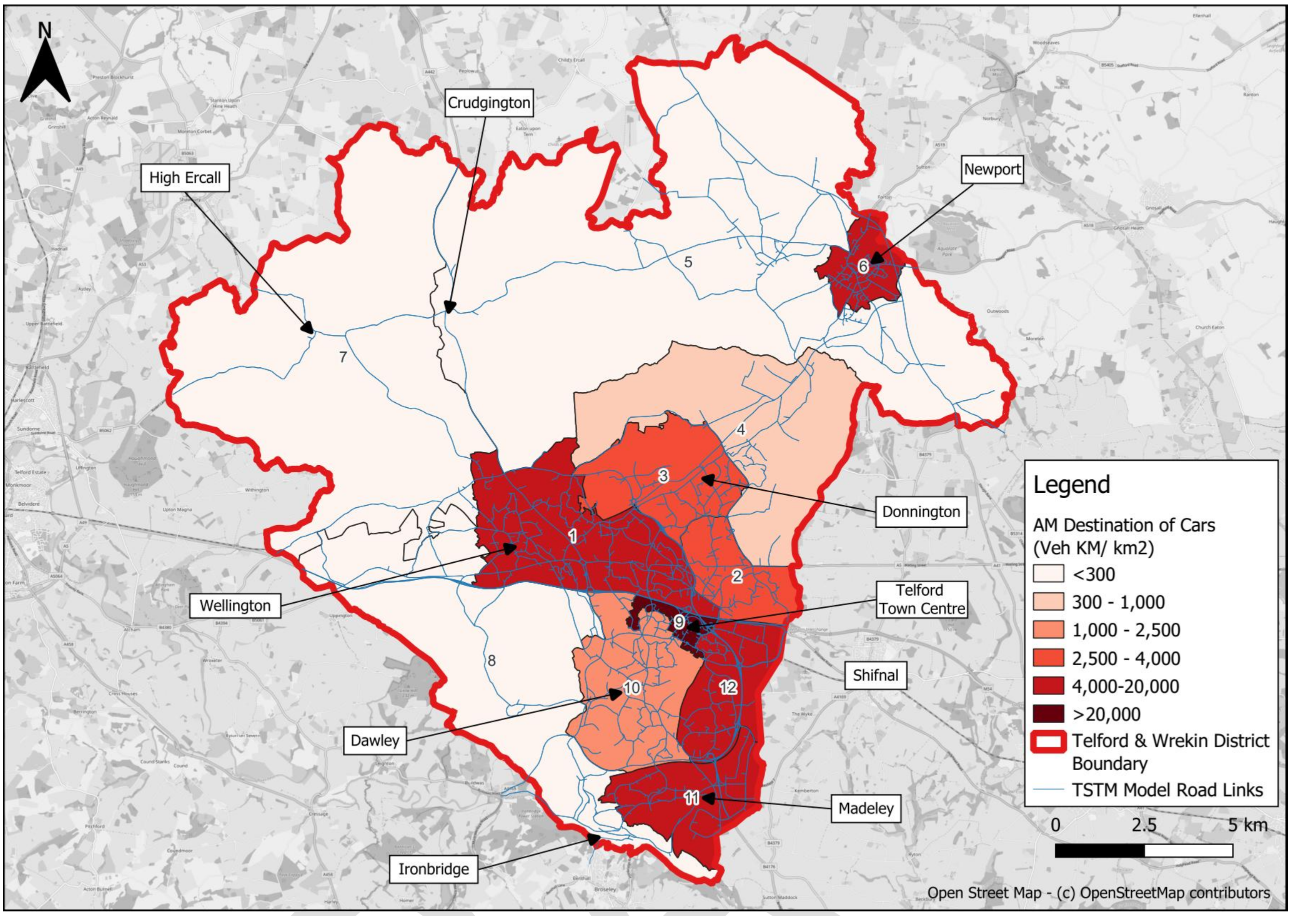

Figure 33: Morning peak car vehicle kilometres for trips ending in Telford and Wrekin per km² by destination sector (Source: TSTM analysis)

Consistent with Figure 28, generally, the patterns shown in Figure 32 and Figure 33 are similar to those for the trip origins illustrated in the previous section with **greater levels of vehicle kilometres and emissions on trips to sectors associated with the denser, more urban sectors**.

One exception to this pattern is Sector 9 (Telford Town Centre). The maps show that this sector acts more as a trip attractor than trip generator in the morning peak. Despite its small area, the sector is in the third highest mapped category in terms of total car vehicle kilometres generated by trips ending in the sector, reflecting a relatively high number of trips and an average trip length of 13 km (compared to 8 km for trips originating in the sector). This relatively high total level of vehicle kilometres means that, when sector area is considered, the sector has the highest level of vehicle kilometres per square kilometre, with levels approximately four times greater than the next highest sector (Sector 12 - Hollinswood, Randlay, Stirchley and Brookside).[56] This reflects the importance of Telford Town Centre for employment access and other services and activities which attract trips in the morning peak.

Trips to Sectors 12, 6, and 11 generate the next highest levels of vehicle kilometres on a per square kilometre basis, again reflecting a concentration of employment and other

[56] Trips to Sector 9 generate just over 28,000 vehicle kilometres per square kilometre whereas trips to Sector 12 generate just over 7000 vehicle kilometres per square kilometre.

services and activities in these sectors, with relatively high average lengths for trips arriving (between 13 km and 18 km).

The pattern for Sector 10 (Dawley, Lawley, Lightmoor) also differs between trip origins and trip destinations. Trips ending in the sector generate a lower level of vehicle kilometres on a per square kilometre basis in the morning peak than trips originating in the sector. This reflects the residential characteristics of the sector and the limited presence of trip attractors.

More rural areas within Telford and Wrekin, such as those within Sectors 5, 7, and 8 are the least likely to generate vehicle kilometres and emissions from trips ending in the sectors in the morning peak, as they also contain limited trip attractors such as employment or other amenities. This results in low levels of trips and vehicle kilometres, despite relatively high average lengths for the trips made (over 15 km). When considered both in terms of total vehicle kilometres and on a per square kilometre basis, the emissions levels associated with trips to the rural sectors are low, with the sectors falling into the lowest mapped category in both Figure 32 and Figure 33.

Goods vehicle kilometres by destination

Figure 34 maps the total vehicle kilometres generated by goods vehicle trips for trips ending in Telford and Wrekin in the morning peak. Again, the darkest shades highlight the sectors generating the most vehicle kilometres. The focus is on inbound trips to provide greatest insight into trip attractors in the borough.

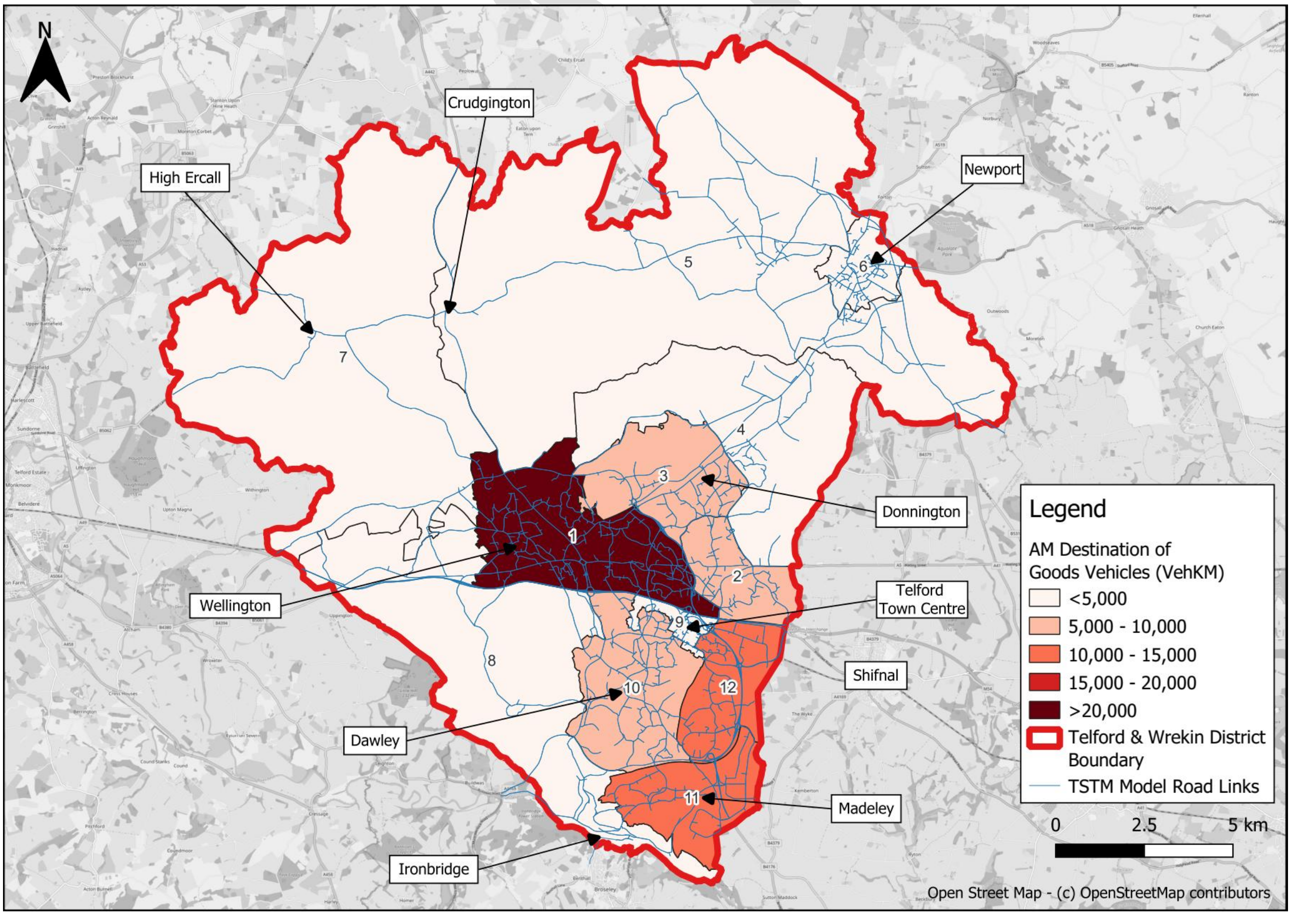

Figure 34: Morning peak goods vehicle kilometres for trips ending in Telford and Wrekin by destination sector (Source: TSTM analysis)

The map shows that trips to Sector 1 (Central Telford and Wrekin) generate the highest goods vehicle kilometres in the morning peak, followed by Sector 11 (Madeley and Halesfield) and Sector 12 (Hollinswood, Randlay, Stirchley and Brookside) respectively. These three sectors all have warehousing distribution business parks within them, including: Stafford Park, Telford 54 Business Park, Halesfield, Tweedale, and Ketley Business Park.

6.3 Emissions by movement type

Telford and Wrekin based trips and through trips

Overall breakdown of emissions

Transport emissions within the borough's boundaries are generated by four broad types of trips (as shown in Figure 35):

- **Internal trips** (both an origin and destination within the borough) – whole trip length
- **Inbound trips** (origin outside the borough, destination inside) – part of trip within boundary
- **Outbound trips** (origin inside the borough, destination outside) – part of trip within boundary
- **Through trips** (origin and destination outside borough) – part of trip within boundary

Changes in emissions on the parts of inbound, outbound or through trips that are outside the borough will influence emissions statistics for other authorities but not for Telford and Wrekin borough.

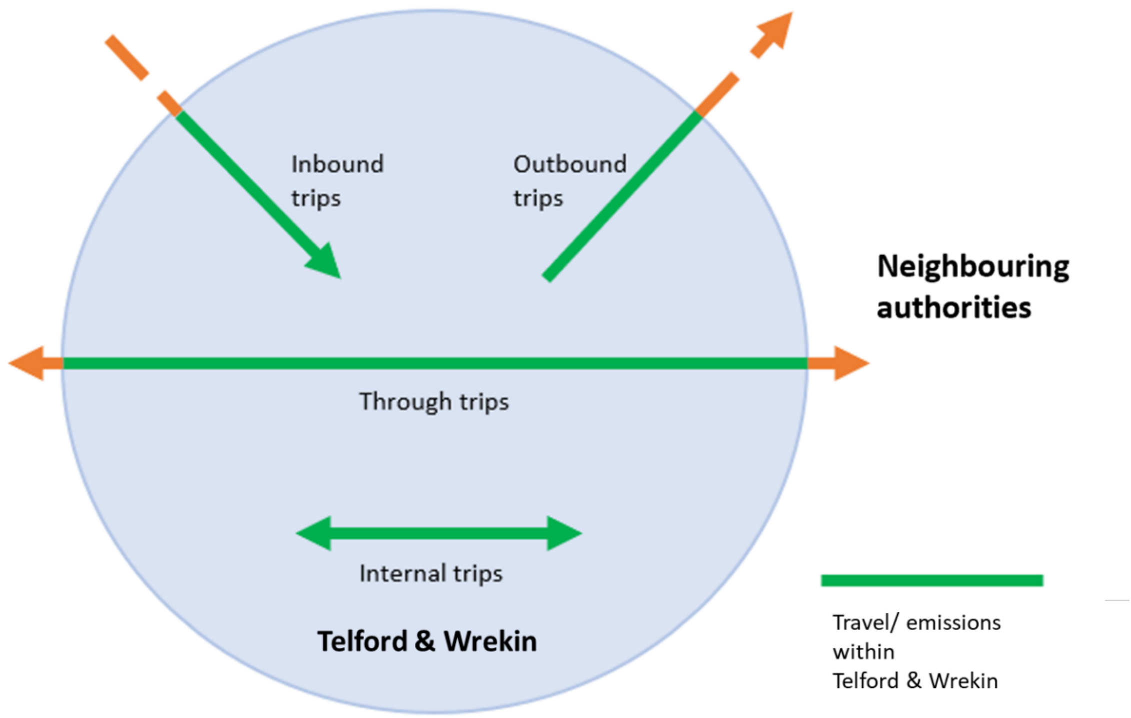

Figure 35: Schematic diagram of Telford and Wrekin and the trip types contributing to emissions within the borough boundaries

Figure 36 presents information from the Midlands Connect Dashboard on the estimated proportion of emissions on the borough's road network that are associated with each type of trip.

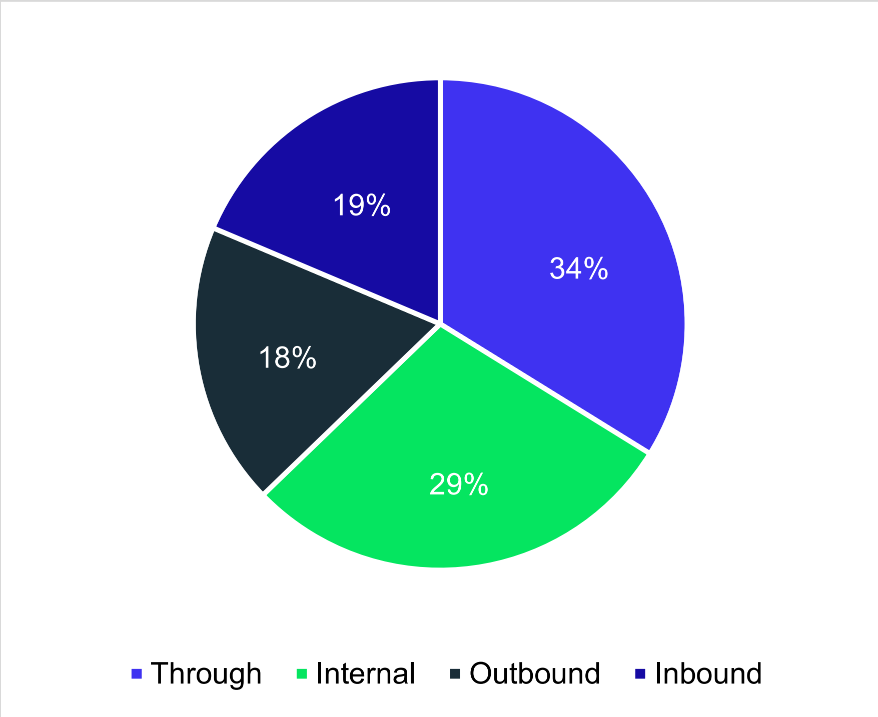

Figure 36: Carbon emissions from road vehicles (excluding PSVs) by trip type, 2019 (Source: Midlands Connect Dashboard)

The analysis indicates that **nearly 35% of overall road emissions within the borough boundary are generated by through traffic**. The remaining emissions are generated by the portion of inbound and outbound **trips within the borough boundaries accounting for nearly 40% of emissions**. Wholly internal trips account for just under 30% of emissions.

Previous baseline analysis undertaken using the Telford Strategic Transport Model (TSTM), using vehicle kilometres as a proxy for emissions,[57] showed that the proportions of vehicle kilometres and emissions associated with each trip type vary considerably by vehicle type. The following sections provide further details.

Car trips

The TSTM baseline analysis estimated that trips with one or both ends within the borough (internal, inbound and outbound trips) termed '**Telford and Wrekin based trips' accounted for nearly 85% of modelled car vehicle kilometres within the borough boundaries** in 2019. Through trips account for the remaining proportion of just over 15%.

Figure 37 shows the vehicle kilometres from the Telford and Wrekin based trips only (excluding through trips).

[57] In the interests of proportionality for this analysis, vehicle emissions are assumed to be directly dependent on vehicle kilometres (i.e. a standard emissions rate per vehicle kilometre for all vehicle kilometres). In practice emissions rates will vary to an extent as a result of driving conditions, particularly speed. However, impacts will be minor and would not influence the key messages drawn from the maps.

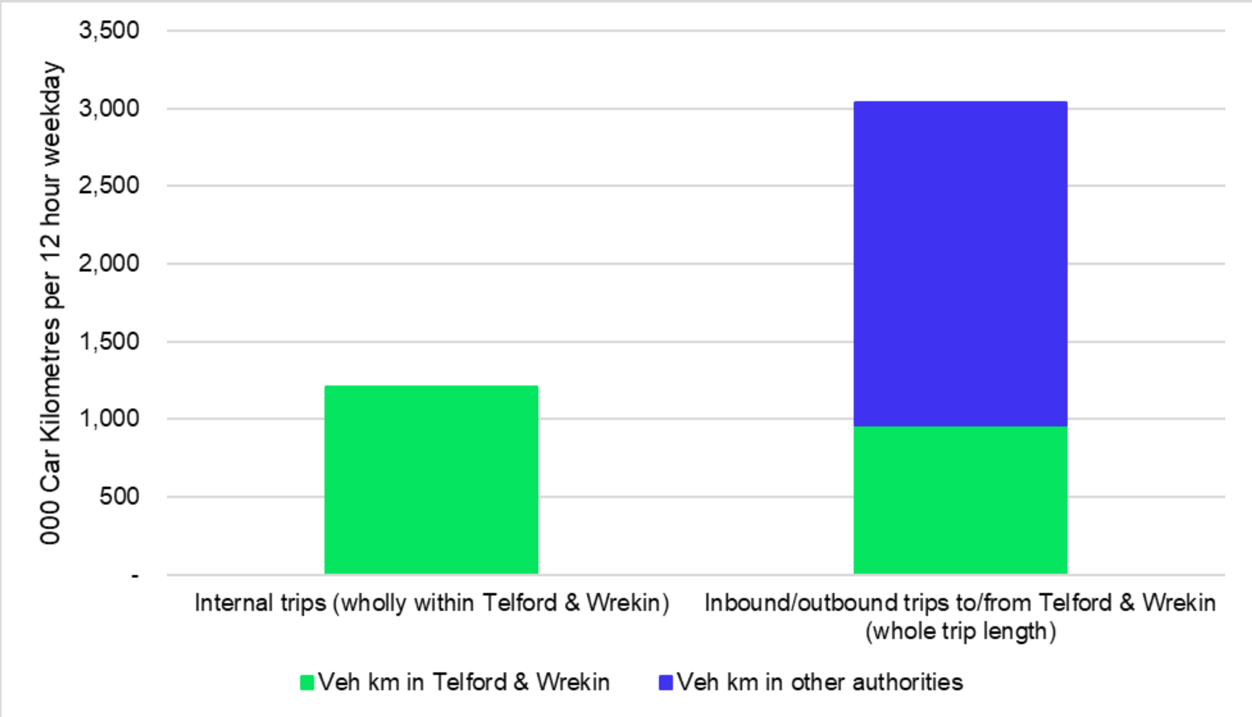

Figure 37: Telford and Wrekin based car vehicle kilometres by trip type and location. Source: Telford Strategic Traffic Model (TSTM) analysis

The figure shows that **internal car trips in Telford and Wrekin account for approximately 55%** of Telford and Wrekin based car trip vehicle kilometres within the borough. The 'in-borough' proportion of **inbound and outbound trips to or from the borough account for the remaining 45%**.

The graph also shows the vehicle kilometres associated with the element of Telford and Wrekin based trips beyond the borough boundaries. The bars show that the green **'in-borough' proportion accounts for just under a third of the total vehicle kilometres associated with inbound / outbound trips** to or from Telford and Wrekin. The remaining two thirds of the vehicle kilometres occur in other authorities.

Goods vehicles trips

The TSTM baseline analysis indicated that approximately **45% of the daily LGV and HGV vehicle kilometres within Telford and Wrekin are generated by through trips** (25% for LGVs and 60% for HGVs), likely to be on strategic roads such as the M54/A5 and A518/A442 between origins and destinations in the wider Midlands and beyond.

The analysis also indicates that **nearly 25% of goods vehicle kilometres occur on trips wholly within Telford and Wrekin** (nearly 35% for LGVs and nearly 15% for HGVs). The remaining **nearly 35% of vehicle kilometres are generated on inbound and outbound trips**, on the in-borough portion of the trips (nearly 40% of LGV vehicle kilometres and just over 25% of HGV vehicle kilometres).

Key car movements to/from and within Telford and Wrekin

Overview

TSTM analysis has been used to indicate the movements within and into and out of Telford and Wrekin that generate the most car vehicle kilometres in the morning peak. This helps to provide further understanding of the areas in which decarbonisation measures would need to be focussed. The analysis considers trips within Telford and Wrekin and between the borough and the seventeen sectors covering the rest of the country (as outlined in Appendix B).

The first section provides an overview of the relative scale of vehicle kilometres on trips within Telford and Wrekin and between Telford and Wrekin and aggregations of external sectors, grouped by broad direction of travel.

The following sections then provide more information about the origins and destinations of some of the most significant internal, inbound and outbound car trips in terms of emissions generated.

The analysis throughout accounts for full trip lengths (not just the proportion of trips within Telford and Wrekin).

Key movements

Figure 38 provides a summary of the origins and destinations of vehicle kilometres for car trips to, from and within Telford and Wrekin. The bright blue segment represents vehicle kilometres on internal trips with both origins and destinations in Telford and Wrekin. The other eight segments show how the vehicle kilometres on inbound and outbound trips are distributed, labelled according to the other 'non-Telford and Wrekin' trip end.

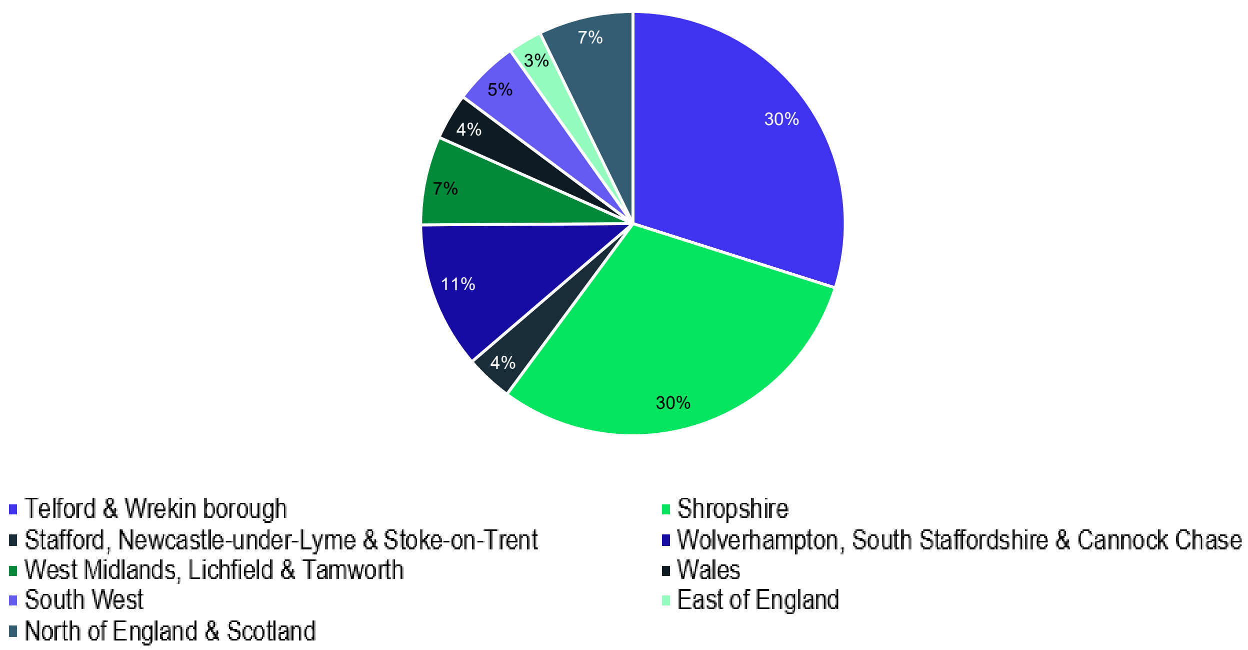

Figure 38: Proportion of car vehicle kms to, from and within Telford and Wrekin by origin/destination area (Source: TSTM analysis)

The chart indicates that **approximately 30% of vehicle kilometres associated with car trips to, from and within Telford and Wrekin are on trips wholly within the borough** (consistent with the summary in Figure 37).

The remainder of the vehicle kilometres are associated with trips with one end outside the Telford and Wrekin boundary. Of these movements, **trips to and from Shropshire account for the largest proportion of vehicle kilometres, representing 30% of the total**. Although total vehicle kilometres between Telford and Wrekin and Shropshire are similar to the total for trips within Telford and Wrekin, they are generated by approximately a third of the number of trips, combined with an average trip length that is approximately three times larger (22 km rather than approximately 7 km for trips within the borough).

The next most significant movements are the mid-length trips (approximately 25 km) between Telford and Wrekin and Wolverhampton, South Staffordshire, and Cannock Chase, accounting for 11% of the total, and longer trips (approximately 50 km on average) between Telford and Wrekin and the West Midlands, Lichfield and Tamworth at 7%. Trips to and from Stafford, Newcastle-under-Lyme and Stoke-on-Trent represent 4% of vehicle kilometres. Overall **trips to and from the wider West Midlands beyond Shropshire account for over 20% of vehicle kilometres**. Trips to and from Shropshire and the wider West Midlands therefore account for over 70% of vehicle kilometres on inbound and outbound car trips.

The remaining 18% of vehicle kilometres are generated by small numbers of long-distance trips (on average over 100 km long) to and from the South West of England, East of England, North of England and Scotland, and Wales.

Further analysis of the individual sector to sector movements contributing to the aggregated patterns shown in Figure 38 identifies that **the top 10 sector to sector movements within Telford and Wrekin all start or end within Sector 1, Central Telford and Wrekin**, reemphasising the importance of the area as a trip attractor and generator, as discussed in the previous section.

Further detail on the most carbon intensive car movements in the morning peak is provided in Appendix C, showing that they fall into three main categories:

- Large trip numbers on very local movements (such as within Sector 1)
- Lower trip numbers on longer trips across the borough (such as Sector 1 to Sector 11, Madeley and Halesfield)
- Mid-range trip numbers and average trip lengths (such as Sector 1 to Sector 3, Donnington and Trench)

However, in total, the top 10 intra-borough movements account for only approximately 35% of vehicle kilometres for car trips wholly within Telford and Wrekin in the morning peak (and under 10% of all car vehicle kilometres in the borough). **This highlights that emissions are dispersed and derived from multiple sources. The overall contribution of any individual movements to boroughwide emissions is limited.**

Looking at the most carbon intensive movements into and out of Telford and Wrekin in the morning peak, the importance of the connection with Shropshire is clear. Six of the top ten movements into Telford and Wrekin in the morning peak originate in Shropshire sectors. The destination sectors within Telford and Wrekin indicate that trips from Shropshire are likely to be made to Telford and Wrekin for employment and other services and activities. This reflects the urban nature of Telford and Wrekin relative to the largely rural nature of Shropshire. Average trip lengths for movements from Shropshire to Telford and Wrekin are mid-range at between 20 km and 35 km.

The wider West Midlands is another important origin for vehicle kilometres on trips into Telford and Wrekin in the morning peak; accounting for three of the top ten movements. In this case the large numbers of vehicle kilometres are the result of fewer trips than the Shropshire movements, combined with longer average trip length of around 50 km. Appendix C provides more details on the carbon intensive movements, including trip numbers and lengths.

Consistent with the inbound trips, most of the most carbon intensive sector to sector movements out of Telford and Wrekin end in Shropshire and West Midlands. The single movement generating the most vehicle kilometres is Central Telford and Wrekin to Wolverhampton & Southern South Staffordshire. This movement has a relatively short average trip length (28 km) and a large number of trips per hour.

Again, each individual movement only accounts for a small proportion of total vehicle kilometres and emissions. Emissions generated on busier movements and corridors are important but **dispersed emissions from rural areas and on less busy movements sum to a significant proportion of the total.**

6.4 Key considerations for the TWTP

The review of the geographical distribution of transport emissions in Telford and Wrekin in this section has reinforced and expanded the key considerations for the development of the TWTP identified in *Transport emissions by source (page 27)*, as follows:

- Decarbonisation measures would need to take account of Telford and Wrekin's characteristics and the distribution of emissions between sources. Measures would particularly need to account for:
  - **The relative contribution of through trips** (~35% of road emissions within the borough, aligning with ~35% being on the SRN, compared to 65% on the LRN and MRN), internal Telford and Wrekin trips (~30%) and inbound/outbound trips (~40%) which are mainly trips to/from Shropshire and the wider West Midlands.
  - **The importance of Telford, particularly the central area, as a generator and attractor** of trips and carbon.
  - **The extent to which emissions are distributed across dispersed movements** meaning that measures cannot be focussed solely on select movements and hotspots. More dispersed emissions from rural areas and less busy movements sum to significant totals.
- A wide range of decarbonisation measures would be needed to respond to the range of emissions sources. For instance, public transport measures are most suited to movements with significant trip numbers. More dispersed trips may be better addressed by shared transport, or alternative forms of accessibility (such as online services or localisation).
- Different stakeholders will have the different potential to influence different elements of emissions.
  - **Telford & Wrekin Council and local stakeholders are likely to have most influence on emissions from internal car trips** as both trip ends are within the borough. Significant influence on inbound/ outbound car trips should also be possible, although it will be important to work with neighbouring authorities and other stakeholders for cross border trips, recognising the reciprocal ability to influence emissions within each other's boundaries.
  - **Through trips by all vehicle types will be more influenced by National Highways and other authorities**.
  - **Telford & Wrekin Council and local stakeholder influence over freight trips is limited** even for trips starting or ending in the borough, which are largely influenced by commercial decision making, particularly those to and from distribution centres where trips are determined by decisions made by companies located elsewhere.

7. Whole life cycle emissions

Key points on whole lifecycle emissions

Infrastructure emissions account for only a small proportion of transport related whole life carbon (WLC) emissions in Telford and Wrekin on an annual basis. As the transport system is already built, emissions are generated only by incremental increases in the network (through new schemes) or the relatively minor impacts of maintenance and repair works (equating to <0.5% of annual transport user emissions in the borough).

However, when considering the **lifecycle of an individual transport scheme, infrastructure emissions are significant** and will become increasingly important as the proportion of ZEVs increases in the fleet. It **can take many years for user savings from an infrastructure scheme to deliver sufficient mode shift to 'pay back' the upfront capital emissions**. For road schemes, the capital emissions are equivalent to a number of years' worth of additional user emissions generated, adding to the net emissions increase caused.

These comparisons highlight the **importance of considering WLC emissions impacts of decisions on transport policies and measures**.

7.1 Introduction

As outlined in *Context (page 7)*, transport sector emissions refer to the emissions from vehicle use (as presented in *Baseline and projected transport sector emissions in Telford and Wrekin (page 18), Transport emissions by source (page 27)* and *Geographical distribution of emissions (page 39)*. However, in transport decision making for LTPs and in other contexts it is important to consider the whole life cycle carbon impacts of the transport system. **Transport decisions and activity also have wider impacts on emissions on other sectors** through their impacts on building and maintaining infrastructure, equipment and vehicles and dealing with them at the end of their lives ('capital carbon') and operating them ('operational carbon').

In Figure 4,[58] the dotted box shows the user emissions that are included in the definition of transport sector emissions. The emissions generated by stages outside the dotted box, 'non-user' emissions, will contribute to sectors other than the transport sector (primarily the industrial sector).

For infrastructure schemes, these 'non-user' emissions, i.e. capital and operational emissions, are often termed the infrastructure emissions of the scheme. They will all contribute to national emissions totals and budgets and will be directly affected by transport decisions and therefore need to be considered in transport strategy development.

Further detail on the more detailed lifecycle stages applied in PAS 2080:2023 (the UK standard for carbon management in buildings and infrastructure)[59] is provided in Figure

[58] Note on terms: Capital carbon is also often termed Embodied carbon. Emissions associated with maintenance and repair are sometimes labelled as Capital carbon rather than Operational carbon.
[59] The British Standards Institution (2023) Carbon Management in Infrastructure PAS 2080:2023. Available at: Revised PAS 2080:2023 | BSI (bsigroup.com)

39. The labels in the bottom row of Figure 4 show the correspondence between the broader lifecycle stages and more detailed stages. The PAS2080 stages are applicable for all infrastructure and buildings schemes and provide the structure for most carbon calculation approaches.

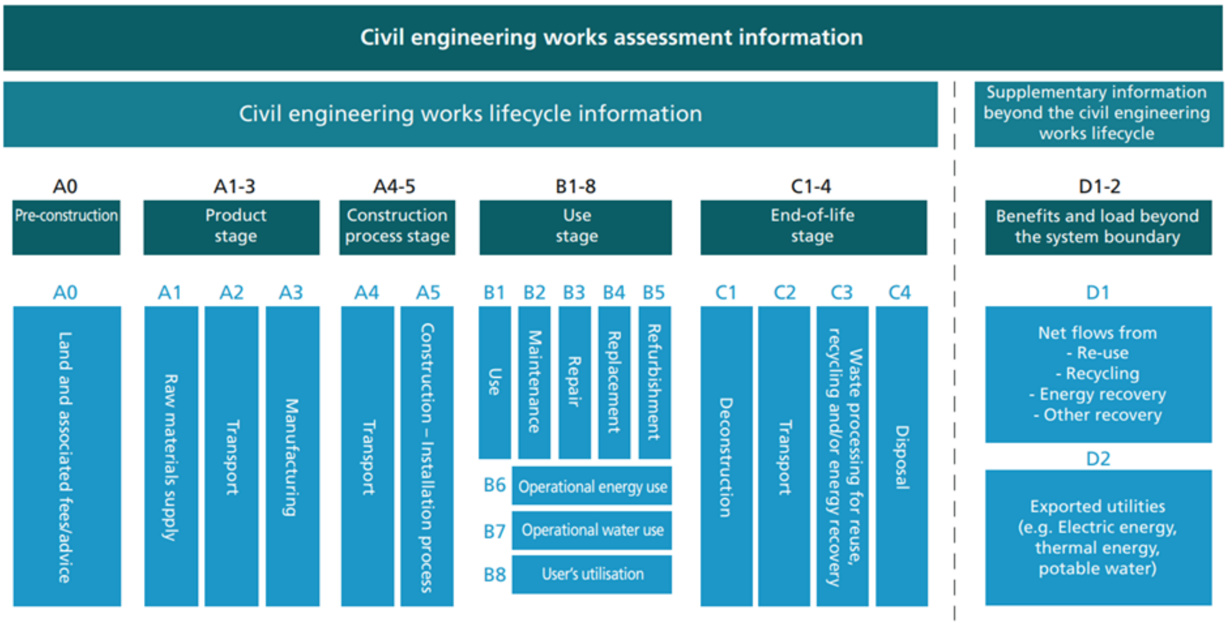

Figure 39: PAS2080 lifecycle stages (BS EN 17472:2022 & PAS2080:2023 guidance note)

On an annual basis, the main infrastructure emissions in Telford and Wrekin are likely to result from:

- Maintenance of existing infrastructure (B2 to B5 in Figure 39). (Operational energy and water use (B6:B7) are generally recognised to be relatively minor in scale in comparison).
- Construction of infrastructure for new schemes (A1 to A5).

The DfT's QCG highlights that it is important to understand the scale of infrastructure emissions in each authority. The next section therefore provides a high level indicative estimate of the emissions associated with highway maintenance in Telford and Wrekin in 2025/2026. The estimates are based on a summary of planned levels of maintenance activity in the borough and two sets of high level benchmarks of the carbon intensity of different maintenance activities:

- the set developed for the Road Surface Treatment Association (RSTA).[60]
- the set included in the DfT's Local Transport Infrastructure Carbon Benchmarking Tool (LTICBT)[61]

The following section then provides an indication of the significance of construction emissions using benchmark information from the LTICBT. Benchmarks from the tool for illustrative infrastructure schemes are compared against user emissions to provide a sense of the relative scale of emissions generated by the different lifecycle stages.

[60] Pye Management for Road Surface Treatment Association (2023) RSTA Carbon Emissions for Road Surface and Other Maintenance Treatments of Asset Management Purposes. Available at: [Document Gallery - RSTA]
[61] Available at: [Local transport infrastructure carbon benchmarking tool - GOV.UK]

7.2 Maintenance emissions

Telford & Wrekin Council's 2025 Annual Local Highway Maintenance Transparency Report to DfT[62] set out planned highway maintenance works for 2025/2026, as summarised in Table 2. The report also stated that the expected split between planned and reactive maintenance works was 78% and 22% respectively.

Activity	2025/26
Carriageway resurfaced (km)	5.2
Carriageway preserved (km)	12.6
Patching (m2)	6000
No. of Potholes filled (estimate)	2500
Footways improved (m2)	30,000

Table 2: Planned maintenance works 2025/2026

The RSTA and LTICBT carbon factors provide benchmark carbon intensities for a range of maintenance activities. These have been used to estimate the carbon emissions of annual highway maintenance works on the basis of the assumptions set out in Table 3.

Activity	Process assumed - RSTA	Process assumed - LTICBT	Other assumptions
Carriageway resurfaced	Surface dressing	Resurfacing	Carriageway width 6.5 m [63]
Carriageway preserved	Preservation	Preservation	Carriageway width 6.5 m
Patching	Thermal patching	Patching	n/a
Potholes filled	Spray injection patching	Patching	Pothole average area of 0.1m^2 [64]
Footways improved	Surface dressing footways	Surface dressing	n/a
Reactive maintenance	Mixed	Mixed	Uplift on planned maintenance of 0.28 (i.e. 22/78)

Table 3: Assumptions applied in estimating maintenance emissions

The benchmark figures vary with the LTICBT factors attributing a greater carbon intensity to the processes than the RSTA factors. However both sets indicate annual average emissions of less than 1500 tonnes or less equating to **less than 0.5% of transport user emissions within Telford and Wrekin** in 2023.

[62] Telford and Wrekin Council (2025) Annual Local Highway Maintenance Transparency Report, Annex A. Available at: Corporate branded Word document template
[63] 6.5 m (2*3.25m) based on Design Manual for Roads and Bridges (DMRB – CD 127) which specifies typical traffic lane widths of 3.25–3.65 m for all purpose roads
[64] Pothole average area based assumption that potholes typically need to be 300 mm wide before it is considered that they need mending. Source: How Are Potholes Measured and Who Is Responsible for Fixing Them in the UK? Assume 350 mm wide on average and a circular shape on average to estimate area.

7.3 Illustrative construction emissions

The analysis of maintenance emissions in the previous section indicates that **infrastructure emissions account for a small proportion of annual transport related whole life carbon (WLC) emissions** associated with the existing transport network. In years where new infrastructure schemes are being built, the proportion of infrastructure emissions will increase. Nonetheless, at the borough level, user will continue to emissions account for the majority of the total WLC transport-related emissions each year. This is because vehicles operate across a large and established transport network, and any new infrastructure typically adds only a small proportion to the overall network.

However, the balance of emissions between lifecycle stages changes when considering the full lifecycle emissions of an individual new transport infrastructure asset from construction through use and maintenance, rather than considering the borough's transport related emissions as a whole. **One way of considering the trade-off between capital carbon and user carbon savings for an individual transport scheme is undertaking 'payback period analysis'**. This identifies the number of years it takes for annual user savings to balance out the initial capital carbon emissions and any ongoing operational emissions.

The DfT's LTICBT provides estimates of capital carbon per unit or kilometre for different types of local transport infrastructure providing a basis for illustrative high level payback period analysis to indicate the relevance of WLC impacts for different scheme types.

Table 4 provides a summary of some of the outputs from the LTICBT for relevant scheme types. The first four columns on the left of the table present LTICBT data on carbon per kilometre of cycle lanes and bus lanes of different types.

The two right hand columns provide a comparison calculated for this report showing how the equivalent amount of emissions could be saved by mode shift away from car trips. The comparisons are expressed in terms of:

- the number of years it would take to generate the emissions; through
- the identified number of car trips of average length per day (at an assumed average speed of 45 kph).

The 'years' column indicates the number of years it would take to save the equivalent of the infrastructure emissions through user emission savings by removing the number of car trips per day identified in the 'car trips' column through mode shift, i.e. the column provides an indication of the payback period for each scheme type.

The calculations assume the DfT TAG car fleet and EV uptake projections (from the May 2026 Data Book) and an opening year of 2030. The average trip length used is the National Travel Survey[65] average length for trips of mode of the scheme being considered in each row e.g. average cycle trip length for cycle lanes and average bus trip length for bus lanes.

[65] DfT (2025) National Travel Survey 2025. Available at: National Travel Survey - GOV.UK

Scheme type	Benchmark	Carbon emissions average per direction (tCO_2e/km) – Construction	Carbon emissions average per direction (tCO_2e/km) – Maintenance/ renewal p.a.[66]	Equivalent user carbon: car trips per day each way	Years
Cycle lane	Light segregation	7	1	50	~1
Cycle lane	Stepped cycle track	104	2	50	>60
Cycle lane	Fully kerbed cycle track	57	1	50	~14
Cycle lane	Cycle track (new track)	56	1	50	~13
Bus lane	Reallocation to bus lane	138	3	250	~2
Bus lane	Widening to bus lane	601	12	250	~43
Bus lane	Partial widening to bus lane	508	8	250	~19

Table 4: LTICBT active and bus scheme capital carbon estimates and user carbon comparisons

The comparisons in the table show that, **as levels of infrastructure required for a scheme increase, the level of mode shift needed to achieve payback becomes increasingly challenging**. The amount of mode shift required to achieve a short payback period would also further increase in a scenario with a higher assumed proportion of ZEV in the fleet, which would mean that, on average, each car kilometre saved by mode shift would deliver a smaller reduction in user emissions. This also means that schemes with later opening years will have longer payback periods as the level of ZEV uptake in the fleet will be higher, reducing the impact of mode shift.

For road schemes that increase road capacity and are therefore likely to increase user emissions, the capital carbon of construction adds further to the net emissions impact of the scheme. The impact can be equivalent to a number of years of the increase in user emissions per kilometre of road, depending on the level of increase in traffic caused, as shown in Table 5 below.

[66] In line with the LTICBT approach, annual maintenance and renewal emissions are taken to be the total over 60 years divided by 60.

Scheme type	Benchmark	Carbon emissions average per direction (tCO_2e/km) – Construction	Carbon emissions average per direction (tCO_2e/km) – Maintenance/ renewal p.a.[67]	Equivalent user carbon: car trips per day each way per km	Years
Road	Local Street	220	4	2500	3
Road	Primary Road	686	13	10000	2

Table 5: LTICBT road capital carbon estimates and user carbon comparisons

The comparison shows that, if the new road induces significant amounts of new traffic, the infrastructure carbon impacts are likely to be relatively moderate compared to the user emissions impact of the additional traffic (particularly if the traffic includes a significant proportion of freight vehicles). However, this balance would change if impacts were mainly through rerouting of traffic from existing roads (rather than new traffic) and/or a higher proportion of ZEV uptake is assumed.

The balance of emissions by lifecycle stage for each infrastructure type would also change significantly if construction involved significant structures such as bridges or tunnels. The figures in Table 4 and Table 5 are based on the DfT benchmarks, assuming limited structural complexity. To illustrate the significance of structures, the LTICBT also provides benchmarks for road bridges as summarised in Table 6.

Scheme type	Benchmark	Carbon emissions average per direction (tCO_2e/km) – Construction	Carbon emissions average per direction (tCO_2e/km) – Maintenance/ renewal p.a. [68]	Equivalent user carbon: car trips per day each way per km	Years
Bridge	Prestressed concrete beam bridge, approx. 30m wide.	6324	2	10000	>>60
Bridge	Steel-concrete composite bridge, approx. 30m wide.	16077	4	10000	>>60

Table 6: LTICBT road bridge capital carbon estimates and user carbon comparisons

The figures highlight that structures such as bridges can be highly carbon intensive and equivalent to many years of high volumes of traffic. Inclusion of bridges in road schemes would therefore add considerably to the net increase in emissions caused by the scheme. Similarly, if active travel or public transport schemes require bridges or equivalent structures, it would significantly increase the payback period and is likely to make payback very challenging in many cases.

[67] In line with the LTICBT approach, annual maintenance and renewal emissions are taken to be the total over 60 years divided by 60.
[68] In line with the LTICBT approach, annual maintenance and renewal emissions are taken to be the total over 60 years divided by 60.

7.4 Key considerations for the TWTP

The review of wider lifecycle transport related emissions in this section has highlighted that **whole life cycle emissions impacts** must be considered in transport decision making.

Emissions from maintenance and new infrastructure typically account for a low proportion of annual whole life transport emissions in Telford and Wrekin. However, the infrastructure carbon emissions from new schemes are significant and, even for schemes achieving reductions in user emissions once implemented, **it can take many years for user savings to 'payback' the upfront capital emissions of construction (and ongoing operational carbon)** and the balance between emissions by lifecycle stages therefore needs to inform decisions.

8. Summary considerations for the TWTP

In collating evidence, analysis and baseline material as the first step in the QCG carbon analysis process, the previous sections suggest a number of key considerations to inform the TWTP as follows:

- **Rapid and significant transport decarbonisation will be needed if Telford and Wrekin is to meet decarbonisation targets**. Transport accounted for nearly 35% of GHG emissions in borough in 2023 and there is a substantial 'emissions gap' between projected emissions and Government and CCC decarbonisation pathways in Telford and Wrekin, as there is nationally.
- **Diverse decarbonisation measures would be needed to close the emissions gap** which would involve reducing emissions from the baseline by approximately 30% in 2030, 50% in 2035 and over 70% in the 2040s.
  - Action to accelerate ZEV uptake beyond the levels projected in response to current and proposed measures would play an important role but would not be enough alone.
  - Additional action would need to reduce emissions by reducing total vehicle kilometres travelled.
- **Decarbonisation measures would need to take account of Telford and Wrekin's characteristics and the distribution of emissions between sources**, including accounting for:
  - The balance of emissions between vehicle types. In 2019: 59% of emissions within the borough were generated by car trips, 19% by HGVs, 17% by LGVs and 5% by public transport.
  - The importance of long trips – over 65% of road emissions within Telford and Wrekin in 2019 were generated by trips over 10 miles long. Short trips generate limited emissions (e.g. NTS figures show car trips under 5 miles account for more than 55% of trips but less than 15% of emissions).
  - The importance of travel for business purposes, accounting for 50% of road emissions in Telford and Wrekin across all vehicle types (including freight). For car trips, leisure travel generates the most emissions (35%).
  - The difference in emissions from car use between different population segments, e.g. more rural and prosperous groups can generate over double the emissions generated by more urban, lower income groups.
  - The relative contribution of through trips (~35% of road emissions within the borough, aligning with ~35% being on the SRN, compared to 65% on the LRN and MRN), internal Telford and Wrekin trips (~30%) and inbound/outbound trips (~40%) which are mainly trips to/from Shropshire and the wider West Midlands.
  - The importance of Telford, particularly the central area, as a generator and attractor of trips and carbon emissions.
  - The extent to which emissions are distributed across dispersed movements meaning that measures cannot be focussed solely on select movements and hotspots. More dispersed emissions from rural areas and less busy movements sum to significant totals.

- **A wide range of decarbonisation measures would be needed to respond to the range of emissions sources**. For instance, active travel measures are most suited to relatively short urban trips and public transport measures for mid/long distance movements with significant trip numbers. More dispersed trips may be better addressed by shared transport, or alternative forms of accessibility (such as online services or localisation).
- **Different stakeholders have greatest potential to influence different elements of emissions**
  - Telford & Wrekin Council and local stakeholders are likely to have most influence on emissions from internal car trips as both trip ends are within the borough. Significant influence on inbound/ outbound car trips should also be possible, although it will be important to work with neighbouring authorities and other stakeholders for cross-border trips, recognising the reciprocal ability to influence emissions within each other's boundaries.
  - Through trips by all vehicle types will be more influenced by National Highways / other authorities.
  - Telford & Wrekin Council and local stakeholder influence over freight trips will be limited, even for trips starting or ending in the borough, which are largely influenced by commercial decision making, particularly those to and from distribution centres where trips are determined by decisions made by companies located elsewhere.
- **Whole life cycle emissions impacts must be considered in transport decision making**. Emissions from maintenance and new infrastructure typically accounts for a low proportion of annual WLC transport emissions in Telford and Wrekin. However, the infrastructure carbon from new schemes is significant and it can take many years for user savings to 'payback' the upfront capital emissions of construction (and ongoing operational carbon) and so the balance between emissions by lifecycle stages needs to inform decisions.

Appendix A. Uncertainties influencing emissions estimates

Introduction

Transport emissions forecasts are based on the following key inputs:

- The number of vehicle kilometres travelled per year by different categories of vehicle.
- The emissions produced per kilometre by each category of vehicle, which in turn depends on:
  - Its energy efficiency (depending on factors like size, weight and shape);
  - The fuel or energy type it uses (e.g. petrol, diesel or electricity); and
  - The way it is driven (particularly speed of travel).

The scenarios presented in *Context (page 7)* represent core assumptions for each of these factors influencing emissions. However, it is important to note that **there are uncertainties in relation to each factor that could alter future emissions from the core projections and therefore change the scale of the emissions reduction required to meet the decarbonisation pathways**.

There are three particularly important areas of uncertainty, specifically:

- Future baseline growth in travel demand;
- Future trends in vehicle purchase (particularly in relation to electric vehicles); and
- Rate of decarbonisation of electricity supply.

The key influences on each of these areas of uncertainty are summarised in turn below.

Travel demand

Economic and population growth

Travel demand has historically been linked to economic and population growth. The DfT's National Road Traffic Projections[69] include two scenarios to illustrate that varying assumptions around growth rates for GDP and population levels can have a significant impact on traffic levels if current trip making behaviours continue. The High Economy and Low Economy scenarios are based on more and less optimistic assumptions on GDP and population levels through time.[70]

The different scenarios result in a difference of approaching 20% in car traffic levels by 2050. The High Economy Scenario results in over 10% more traffic than the Core Scenario and the Low Economy Scenario results in over 5% less car traffic than the Core Scenario. The range for HGV traffic is similar to the range for car traffic whilst the range for LGV

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[69] DfT (2022) National Road Traffic Projections 2022. Available at: [National road traffic projections 2022 (publishing.service.gov.uk)]

[70] Based on ONS High and Low population variation projections, the High Economy Scenario assumes a population of 75.6 million by 2060 and the Low Economy Scenario assumes population drops from a peak in the early 2030s to 57.5 million by 2060 (compared to just over 70 million in the Core scenario). GDP projections were based on modifying the Core Scenario GDP per capita growth rates by +/- 0.5 percentage points p.a. This results in GDP levels that are 43% higher than the Core Scenario in 2060 in the High Economy scenario and 25.5% lower in the Low Economy scenario. GDP per capita growth between 2025 and 2060 ranges between 28% and 131%.

traffic is wider, the varying assumptions result in a 40% difference in traffic levels between the Low and High Economy scenarios. The High Economy scenario generates approximately 20% more LGV traffic than the Core in 2050 and the Low Economy scenario generates approximately 15% less LGV traffic.

These scenarios highlight the potential for travel demand to increase if economic or population growth is stronger than expected and current trip making patterns continue. Any increase in demand growth would increase the scale of the emissions gap and decarbonisation challenge.

Characteristics of the local population

In addition to the influences of economic and population growth, future demand growth will be affected by other factors including more detailed characteristics of the local population through time. Levels of travel and particularly of private car use vary between different segments of the population (influenced by factors such as rural or urban residential location and income levels, discussed further in *Baseline and projected transport sector emissions in Telford and Wrekin (page 18)*). The balance of future population growth in Telford and Wrekin between different segments of the population is therefore likely to have a significant influence on future emissions levels. For instance urban growth would tend to lead to lower levels of transport emissions than rural growth.

Rebound effect

A further area of uncertainty in relation to future levels of travel demand is the extent to which a ‘rebound effect’ will occur from the increased use of Electric Vehicles (EVs). As the cost of operating an EV is currently lower than the cost of operating a petrol or diesel car (even with rising electricity costs),[71] evidence suggests that people will tend to drive more if they have an EV. This is termed the ‘rebound effect’ whereby people increase the amount they travel in response to reduced travel costs. The impact on emissions is relatively limited as the vehicles used more are electric, but the implications of the increased mileage for traffic and congestion could be significant. Research undertaken for Defra[72] suggests that traffic might increase by 3% amongst EVs for every 10% reduction in EV operating costs relative to petrol and diesel operating costs.

Trends in vehicle purchase

Rate of uptake of zero emissions vehicles

The rate of uptake of zero emissions vehicles (ZEV) is the key vehicle purchase trend that will influence future emissions and there is considerable variation in views on potential uptake rates from different sources.

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[71] EDF (no date) How much does it cost to charge & run an electric car? Available at: How Much Does it Cost to Charge & Run an Electric Car? (edfenergy.com) and Zapmap (no date) Journey Cost Calculator. Available at: Journey Cost Calculator guide - Zapmap (zap-map.com)

[72] Ricardo for Defra (2016) Evidence Review and expert elicitation exercise on behavioural responses to changes in vehicle economics. Appendix 2 to project summary report for contract AQ0959 Exploring and appraising proposed measures to tackle air quality. Available at: https://uk-air.defra.gov.uk/assets/documents/reports/cat05/1605120948_AQ0959_appendix_2-behavioural_responses_to_changes_in_vehicle_economics.pdf

This uncertainty reflects different views on factors such as the level and timing of government and local measures to encourage EV purchase and the approach of vehicle manufacturers. The views of the public will also be important, including their attitudes to the phase out of petrol and diesel cars in the late 2020s, particularly whether buyers will be keen to purchase an EV (potentially influenced by their confidence in the availability of charging infrastructure) or would rather take the opportunity to buy a last petrol or diesel car.

Figure 40 **Error! Reference source not found.**shows 12 recent forecasts of the uptake of electric cars. The projections include the three scenarios from the Midlands Connect Baseline Emissions Dashboard (business as usual, localised EV uptake and accelerated EV uptake), as described in *Baseline and projected transport sector emissions in Telford and Wrekin (page 18)*, and the projection from the latest TAG Databook (November 2025).[73] Two scenarios representing the different views within National Energy System Operator (NESOs) Future Energy Scenarios 2025 (the scenarios are described in more detail in Appendix B)[74] are also shown along with the Balanced Pathway projection from the CCC's Seventh Carbon Budget.[75] The remaining five projections were included in the CCC's Seventh Carbon Budget report[76] for comparison with their projection.

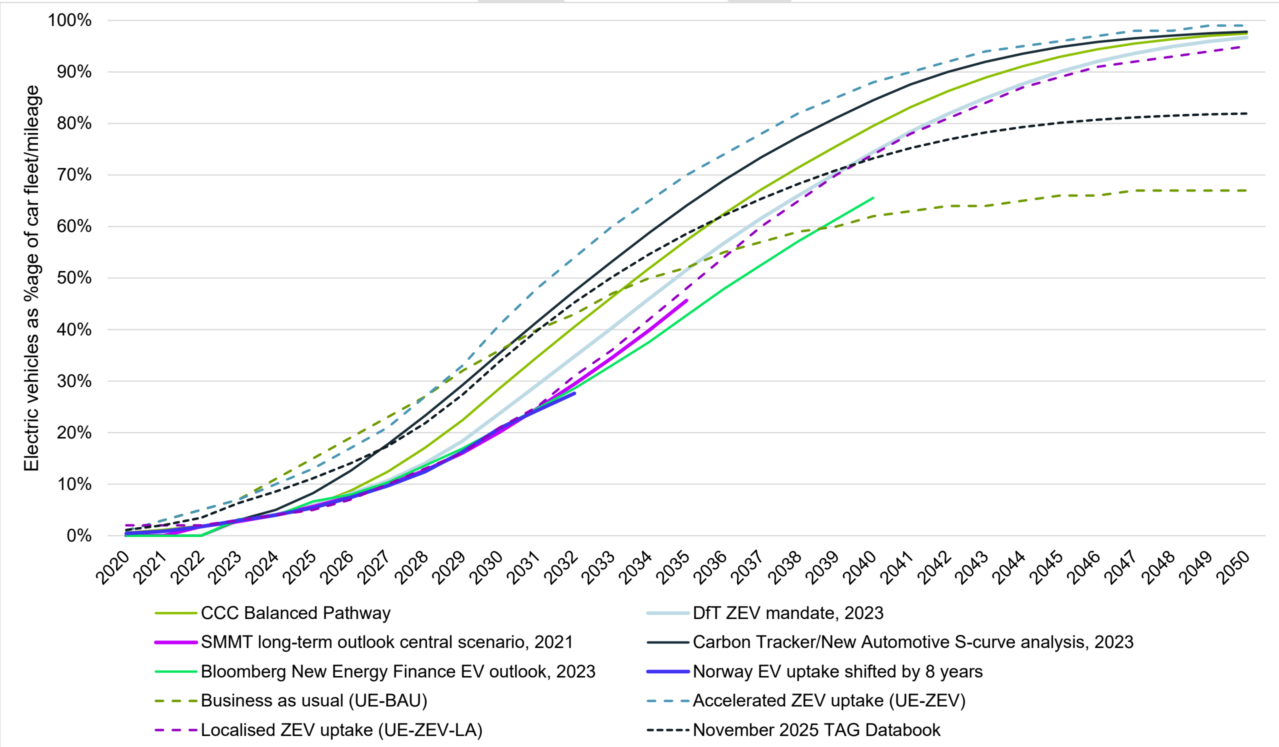

Figure 40: Electric car uptake scenarios

The figure gives an impression of the range of projections but is difficult to interpret clearly due to the number of lines. To help compare the uptake assumptions more clearly, Table 7

[73] DfT (2025) TAG Databook November 2025 Available at: TAG data book - GOV.UK
[74] National Energy System Operator (NESO) (2025) Future Energy Scenarios. Available at: Future Energy Scenarios 2025: Pathways to Net Zero) The projected EV uptake rate for three of the four NESO Future Energy Scenarios (electric engagement, hydrogen evolution and holistic transition) are almost identical and so have been combined to simplify the graph
[75] Figure 7.1.3 of CCC (2025) Seventh Carbon Budget Available at: The Seventh Carbon Budget - Climate Change Committee
[76] ibid

summarises the projected level of uptake of electric cars in each scenario at five year intervals to allow a clearer comparison. The bottom rows show the maximum and minimum level of projected uptake from the twelve scenarios showing the considerable range in each year. For instance, projections in 2030 vary between 20% and 41% being electric and, by 2040, the range is between 62% and 91%.

It should be noted that there may be some inconsistency between the figures from different sources because some (such as the CCC) relate to the proportion of the number of vehicles in the car fleet that are electric and some (such as the TAG data book) relate to the proportion of mileage travelled by EV which might be higher than the proportion of vehicles if EVs are assumed to travel above average mileage (or vice versa). The sources are not always clear on this assumption or on the treatment of plug-in hybrids in the proportions. However, these possible inconsistencies would have a relatively minor impact and would not change the overall patterns shown of a considerable range of views on rate of uptake of electric cars.

The comparison shows that the Midlands Connect Baseline Dashboard Accelerated EV uptake scenario is right at the top of the range of scenarios throughout the time period to 2050, aligning with its description that it is an ambitious, illustrative view of potential take up. The Midlands Connect BAU scenario has the highest assumed uptake in 2030 but drops to the lowest by 2040. The Localised EV scenario (used as the comparator line for the emissions gap analysis in *Baseline and projected transport sector emissions in Telford and Wrekin (page 18)*) is at the low end of the range in 2030 but lower to middle range through the 2030s, aligning closely with the projection produced for the ZEV mandate in 2023 and slightly lower than the CCC 7th Carbon Budget Balanced Pathway.

Scenario	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Business as usual (UE-BAU)	15%	36%	52%	62%	66%	67%
Accelerated ZEV uptake (UE-ZEV)	13%	41%	70%	88%	96%	99%
Localised ZEV uptake (UE-ZEV-LA)	5%	21%	48%	74%	89%	95%
November 2025 TAG Databook	11%	34%	59%	73%	80%	82%
CCC Balanced Pathway	6%	29%	57%	80%	93%	97%
DfT ZEV mandate, 2023	6%	24%	52%	74%	90%	97%
SMMT long-term outlook central scenario, 2021	6%	20%	46%			
Carbon Tracker/New Automotive S-curve analysis, 2023	8%	35%	64%	85%	95%	98%
Bloomberg New Energy Finance EV outlook, 2023	7%	21%	43%	66%		
Norway EV uptake shifted by 8 years	5%	21%				
NESO Net Zero scenarios	7%	27%	62%	91%	100%	100%
NESO Falling behind	6%	20%	42%	71%	93%	99%
Maximum	**15%**	**41%**	**70%**	**91%**	**100%**	**100%**
Minimum	**5%**	**20%**	**42%**	**62%**	**66%**	**67%**

Table 7: Electric car uptake projections at 5-year intervals

Variations in EV uptake forecasts for cars will have a significant effect on the extent to which emissions will be reduced by fleet change in the late 2020s and early 2030s and beyond. This will, in turn, determine the size of the remaining emissions gap that will need to be closed by other measures.

There is also considerable uncertainty over the uptake of zero emissions HGVs in terms of the types of vehicle, when they will be developed, and when they will be taken up. However, even the most ambitious forecasts do not envisage significant take up before the mid-2030s as the technology is still developmental and evolving.

It is widely agreed that electric vehicles will dominate the zero emissions car and van fleets[77] as the technology is well advanced and will be cost effective compared to hydrogen vehicles and other options. The Government's Hydrogen Strategy[78] identified that hydrogen has the potential to complement electrification to provide zero emissions energy for heavier vehicles such as HGVs, buses and trains in scenarios where battery technology does not suit the vehicles' needs (for instance for long range travel). Zero emissions technologies for heavy vehicles have been developing rapidly and developments are leading to the view that the role of hydrogen is likely to be limited. The CCC stated in their 2025 Seventh Carbon Budget report[79] that by 2040: "*There will be no hydrogen cars or vans, and very little or potentially even no role for hydrogen in heavier vehicles.*"

Trend for SUV purchase

A second vehicle purchase trend with an important potential influence on future transport emissions is the increasing trend for SUV purchase. SUVs are inefficient vehicles and produce above average emissions per km of travel (with average emissions per kilometre that are 15% to 20% higher than an average car and 35% to 40% higher than a small car).[80] However, they have been increasing in popularity amongst drivers over recent years, leading to increased fuel use that has offset the benefits of improvements in vehicle efficiencies across the fleet on average. In 2015 SUVs accounted for approximately 14% of cars sold and by 2025 they accounted for over 35% by of sales.[81]

If this trend continues it will increase future emissions and the scale of the challenge in meeting the carbon targets and pathways in Telford and Wrekin and nationally.

Decarbonisation of electricity supply

A rapid reduction in the emissions associated with generating electricity is a fundamental requirement of the pathway to Net Zero emissions across all sectors of the economy. For the transport sector, the level of carbon intensity of electricity generation achieved by the

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[77] For instance the Climate Change Committee and Energy Systems Catapult indicate that hydrogen cars and LGVs are unlikely to account for a significant proportion of the future fleet as they will not be cost competitive with EVs (e.g. Energy Systems Catapult, 2020, Innovating for Net Zero. Committee on Climate Change, 2018, Hydrogen in a Low Carbon Economy). In addition the CCC's 7th Carbon Budget published in 2025 assumes that electric rather than hydrogen vehicles will dominate the zero emissions fleet for cars and LGVs. The DfT's Transport Decarbonisation Plan published in July 2021 makes similar assumptions.

[78] BEIS (2022) UK Hydrogen Strategy. Available at: https://www.gov.uk/government/publications/uk-hydrogen-strategy

[79] CCC (2025) Seventh Carbon Budget Available at: The Seventh Carbon Budget - Climate Change Committee

[80] Based on conversion factors for Dual Purpose 4X4 for SUV, Average Car and Small Car from the Department for Energy Security and Net Zero (2025) Greenhouse gas reporting: conversion factors 2025. Available at: Greenhouse gas reporting: conversion factors 2025 - GOV.UK

[81] Data to 2018 extracted from UKERC (2019) UKERC Review of Energy Policy 2019, ukerc_review_energy_policy_19.pdf (d2e1qxpsswcpgz.cloudfront.net). 2019 to 2025 figures derived from SMMT Motor Industry Facts 2020, 2021, 2022, 2023, 2024, 2025 and 2026 using the UKERC definition that SUVs equate to the Dual Purpose vehicle segment. SMMT data available at: SMMT | Supporting & promoting the UK automotive industry

2040s will have a significant impact on emissions in that decade. This is because the majority of vehicles will be powered by electricity (or hydrogen produced from electricity).

It is widely agreed that rapid decarbonisation of the UK electricity supply will be possible, but views vary on the size of the reduction, and the extent to which emissions per kWh generated will have reduced by the 2040s,[82] as shown in **Error! Reference source not found.**. For instance, if electricity decarbonises at the rate forecast by DESNZ (the forecast used in government appraisal guidance including TAG),[83] estimated emissions from electricity generation would be two to three times greater in the 2040s than in the more optimistic forecast in the CCC's Seventh Carbon Budget[84] on the rate of decarbonisation of electricity, even though the carbon produced per kWh of electricity in both scenarios would be less than approximately 10% of the 2024 levels (in gCO_2e/kWh).

The National Energy System Operator (NESO) also produces four Future Energy Scenarios. Three represent different ways in which the electricity system could decarbonise to reach Net Zero (with the scenarios representing a greater focus on electrification, a greater focus on hydrogen and a more balanced approach – see box at the end of the Appendix). The fourth represents a situation in which decarbonisation 'falls behind' and flattens out in the 2030s. The three Net Zero scenarios take a more ambitious view on how rapidly the system could decarbonise compared to DESNZ and the CCC, particularly the rate of decrease in the 2020s, with estimated carbon emissions intensity remaining below the DESNZ and CCC projections throughout the 2030s and first half of the 2040s.

If these projections are met the impact of uptake of electric vehicles will have a more positive impact on emissions than projected. The 'Falling Behind' scenario highlights the importance of grid decarbonisation occurring alongside uptake of EVs. In this scenario, by 2045, emissions from EVs would be more than 5 times as large than the levels assumed under the DESNZ projections on grid carbon intensity.

Note that the NESO projections are in terms of gCO_2 per kWh whereas the DESNZ projections are in gCO_2e per kWh. However this should not significantly influence the patterns shown, the latest DESZNZ greenhouse gas conversion factors[85] indicate that CO_2 accounts for over 98.5% of the CO_2e emissions in the current electricity generation mix.

[82] For instance forecasts are generated by the government (BEIS, 2023, Table 1: Electricity marginal emissions factors to 2100. Available at: data-tables-1-19.xlsx), the Climate Change Committee (CCC, 2025, Seventh Carbon Budget Charts Dataset. Available at: The Seventh Carbon Budget - Climate Change Committee) and the National Energy System Operator (NESO), 2025, Future Energy Scenarios. Available at: Future Energy Scenarios 2025: Pathways to Net Zero)
[83] DfT (2025) TAG Databook November 2025 Available at: TAG data book - GOV.UK
[84] CCC (2025) Seventh Carbon Budget Charts Dataset. Available at: The Seventh Carbon Budget - Climate Change Committee)
[85] DESNZ (2025) Greenhouse gas reporting conversion factors 2025, UK electricity tab. Available at: Greenhouse gas reporting: conversion factors 2025 - GOV.UK

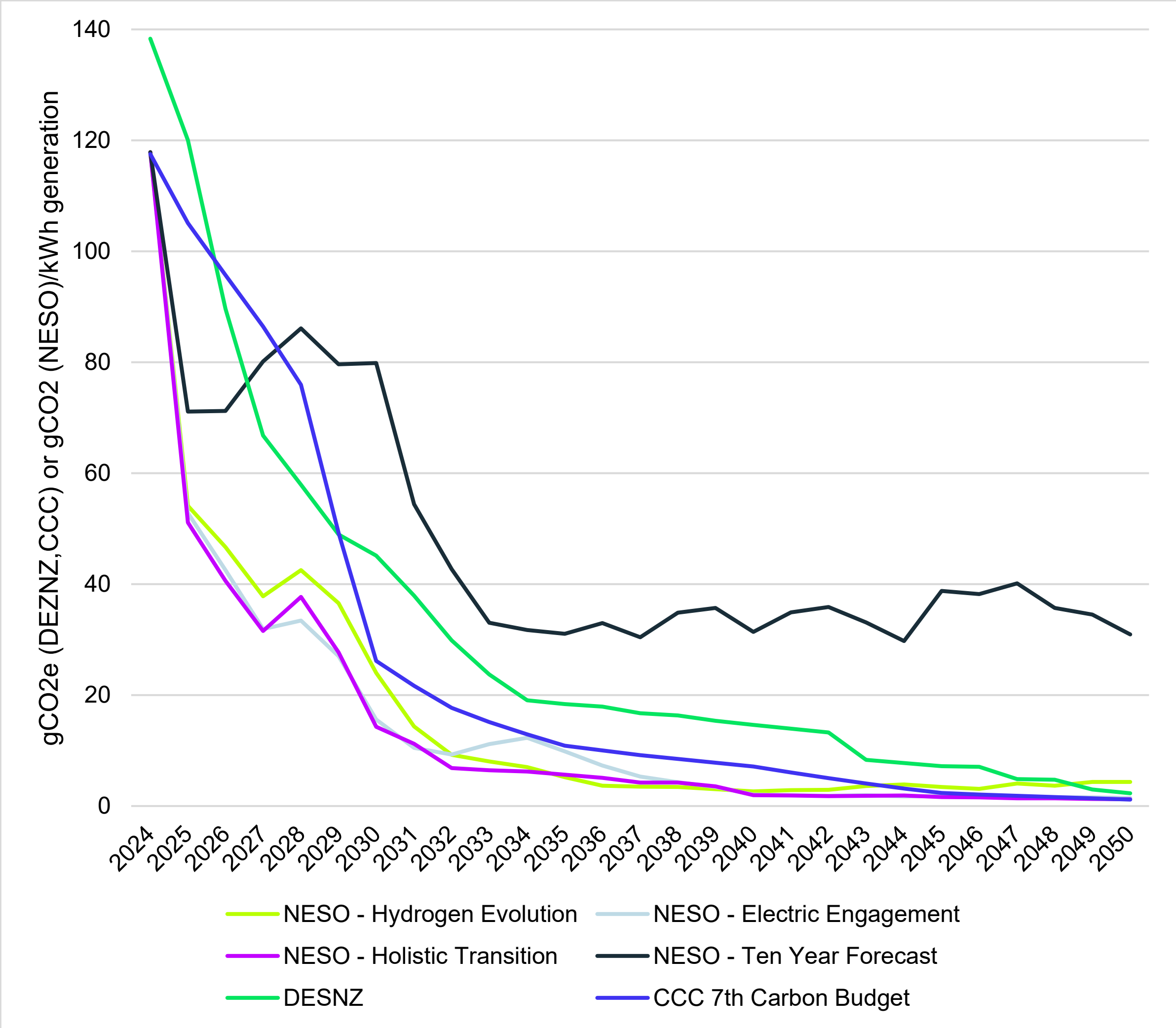

Figure 41: Electricity decarbonisation scenarios

NESO Future Energy Scenario Descriptions

Electric Engagement – Net Zero is met mainly through electrified demand. Consumers are highly engaged in the transition through smart technologies that reduce energy demand, such as electric heat pumps and electric vehicles. Pathway with the highest peak electricity demand, requiring high nuclear and renewable capacities. It also has the highest level of bioenergy with carbon capture and storage across all Net Zero pathways. Supply side flexibility is high, delivered through electricity storage, interconnectors and low carbon dispatchable power.

Hydrogen Evolution – Net Zero is met through fast progress for hydrogen in industry and heat. Widespread access to a national hydrogen network is assumed. Some consumers will have hydrogen boilers, although most heat is electrified. There are low levels of consumer engagement within this pathway. Hydrogen is used for some heavy goods vehicles, but electric vehicle uptake is strong. The pathway sees high levels of hydrogen dispatchable power plants, leading to reduced need for renewable and nuclear capacities. Hydrogen storage provides the most flexibility in this pathway.

Holistic Transition – Net Zero is met through a mix of electrification and hydrogen, with hydrogen mainly used around industrial clusters. Hydrogen is not used for heat except as a secondary fuel for heat networks in small quantities. Consumer engagement is very strong through adoption of energy efficiency improvements and demand shifting, with smart homes and electric vehicles providing flexibility. A high-renewable capacity pathway, with unabated gas dropping sharply. The pathway sees moderate levels of nuclear capacity and lowest levels of hydrogen dispatchable power. Supply side flexibility is high, delivered through electricity storage and interconnectors. No unabated gas remains on the network in 2050.

Falling Behind – Considers a world where some decarbonisation progress is made against today, but at a pace not sufficient to meet Net Zero. Used in downstream gas and electricity security of supply processes - NESO identify that it is important that Falling Behind is used alongside the Net Zero pathways to consider the full range of potential demand levels for possible remaining reliance on unabated fossil fuels. With the current level of low carbon projects in the pipeline and increased policy ambition, some level of progress is considered in the scenario in areas where there is increased certainty or progress.

Appendix B. Sector system

Sectors outside Telford and Wrekin

Table 8, Figure 42 and Figure 43 describe the 17 sectors in the sector system used in the analysis in *Sector based hotspot origins and destinations (page 41)* that fall outside Telford and Wrekin borough. Further details on the 12 sectors within Telford and Wrekin are provided in *Sector based hotspot origins and destinations (page 41)*.

Sector no.	Sector name	Description
13	East Shropshire	Shifnal, Albrighton
14	South East Shropshire	Bridgnorth, Much Wenlock
15	Rural Central Shropshire	Rural small villages including Dorrington, Cressage
16	South West Shropshire	Ludlow, Craven Arms, Church Stretton, Bishop's Castle
17	Shrewsbury	Shrewsbury Town Centre and surrounding north and west areas
18	North Shropshire	Oswestry, Ellesmere, Wem, Whitchurch, Market Drayton
19	West Stafford District	Eccleshall, Gnosall
20	East Stafford District	Stafford, Stone
21	Newcastle-under-Lyme & Stoke-on-Trent	Newcastle-Under-Lyme, Stoke-on-Trent
22	Cannock Chase & Northern South Staffordshire	Penkridge, Cannock, Rugeley, Hednesford
23	Wolverhampton & Southern South Staffordshire	Wolverhampton. Southern South Staffordshire - Wombourne, Stourton, and Kinver
24	West Midlands	Dudley, Sandwell, Walsall, Birmingham, Solihull, Coventry
25	Lichfield & Tamworth District	Lichfield, Tamworth
26	Wales	Wales
27	South West	Herefordshire, Worcestershire, Warwickshire, Gloucestershire, West of England, Wiltshire, Somerset, Dorset, Devon, Cornwall
28	East of England	Greater London, South East, East of England
29	East Staffs, East Midlands, North of England & Scotland	East Staffordshire (inc Burton), East Midlands, North East, North West, Yorkshire, Scotland

Table 8: Sector descriptions for sectors outside Telford and Wrekin borough

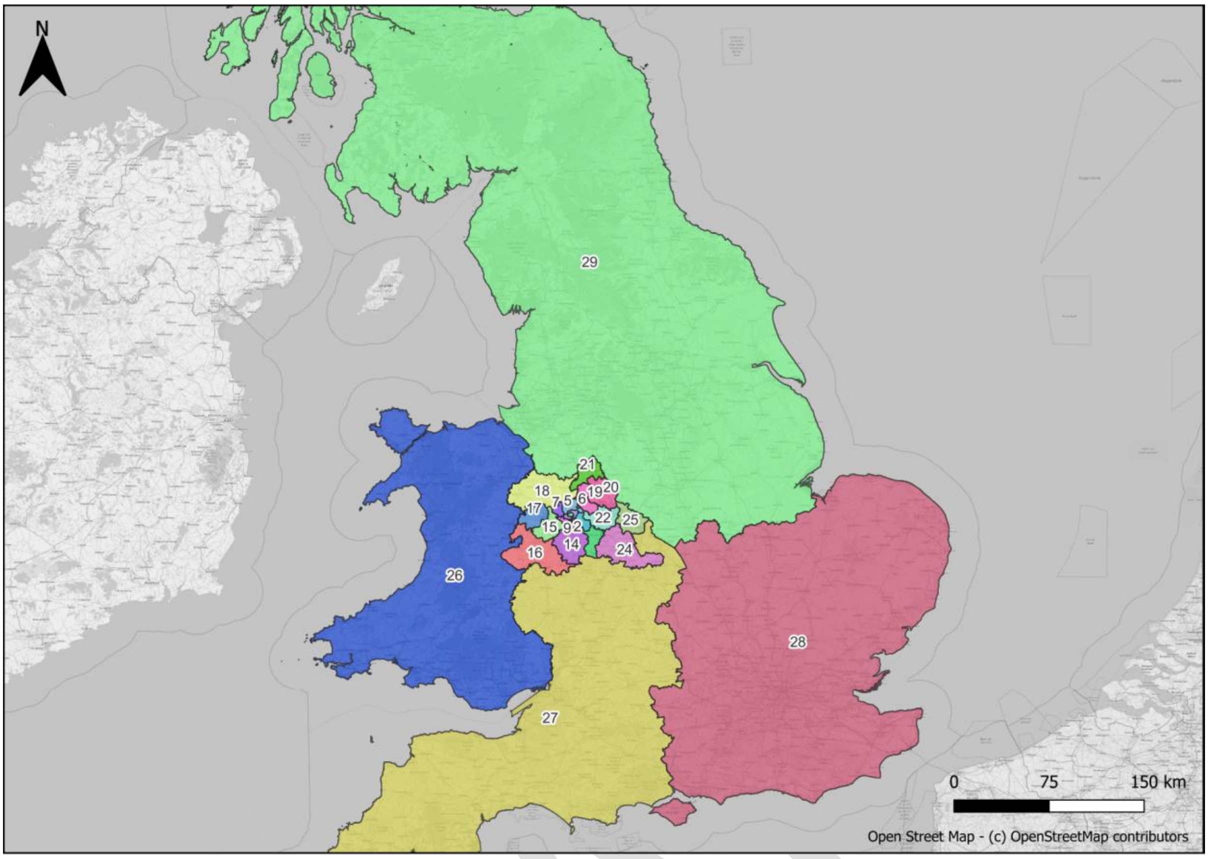

Figure 42: 29 sector system, nationwide

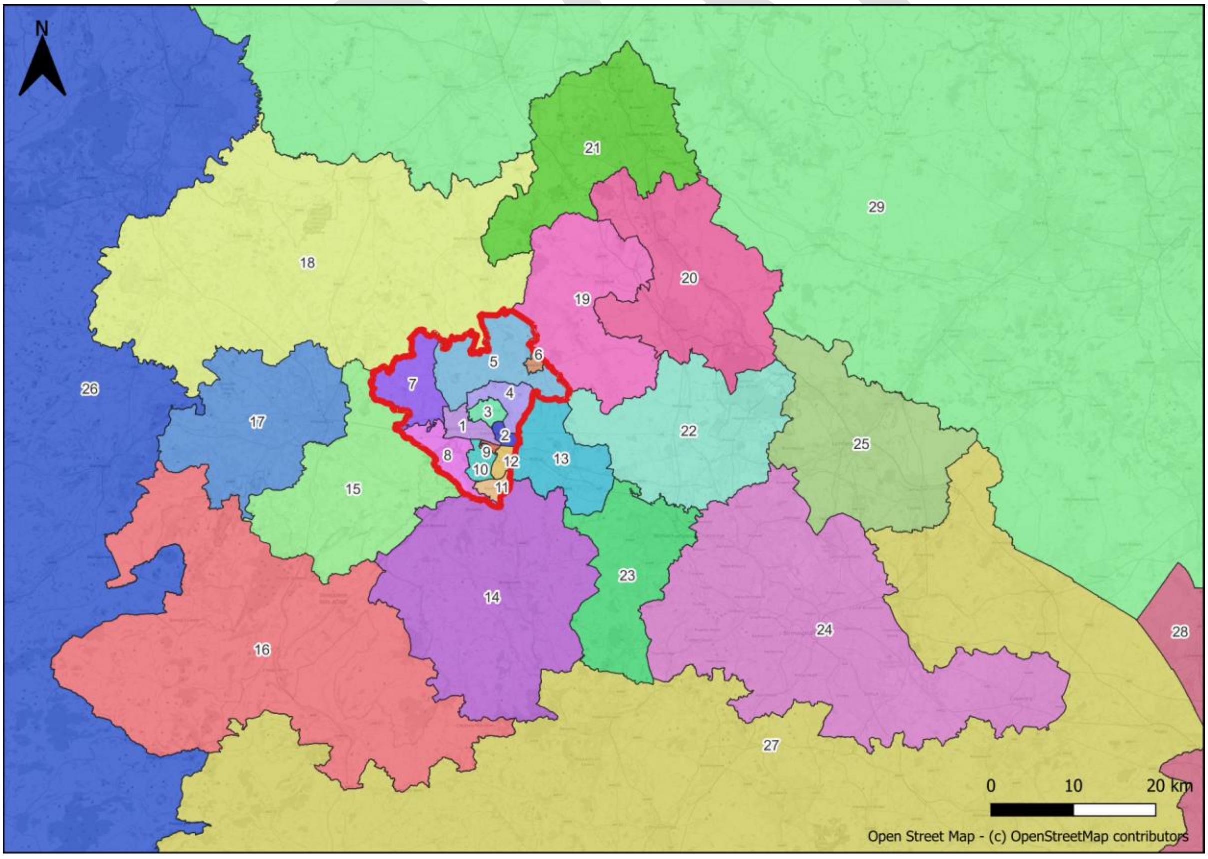

Figure 43: 29 sector system focussed on Telford and Wrekin borough and surrounding areas

Appendix C. Key Telford and Wrekin based car movements

Key car movements within Telford and Wrekin

Table 9 provides further detail in relation to the internal movements shown in the bright blue segment of Figure 38. It lists the 10 sector to sector movements within Telford and Wrekin (both sector-to-sector and intra-sectoral) that are responsible for the most car vehicle kilometres and therefore carbon emissions in the morning peak. The calculation has been based on the number of trips between the sectors in the borough and the average trip length for each movement, as shown in the table.

Origin sector	Destination sector	Vehicle kms	Number of trips	Av trip length (km)
1) Central T&W	12) Hollinswood, Randlay, Stirchley & Brookside	6,910	820	8
10) Dawley, Lawley, Lightmoor	1) Central T&W	6,000	930	6
1) Central T&W	1) Central T&W	5,990	1,585	4
1) Central T&W	11) Madeley & Halesfield	5,510	480	11
11) Madeley & Halesfield	1) Central T&W	5,430	435	12
1) Central T&W	3) Donnington & Trench	4,650	835	6
1) Central T&W	9) Telford Town Centre	4,240	645	7
12) Hollinswood, Randlay, Stirchley & Brookside	1) Central T&W	4,200	470	9
6) Newport	1) Central T&W	4,070	290	14
3) Donnington & Trench	1) Central T&W	4,000	720	6

Table 9: Top 10 sector-sector movements for car vehicle kilometres within Telford and Wrekin (morning peak)

The top 10 movements shown in the table fall into three main categories:

- Large trip numbers on very local movements (such as within Sector 1, Central Telford and Wrekin)
- Lower trip numbers on longer trips across the borough (such as Sector 1, Central Telford and Wrekin to Sector 11, Madeley and Halesfield)
- Mid-range trip numbers and average trip lengths (such as Sector 1, Central Telford and Wrekin to Sector 3, Donnington and Trench)

All of the movements identified either start or end in Sector 1, Central Telford and Wrekin, reemphasising the importance of sector as a trip attractor and generator, as discussed in *Geographical distribution of emissions (page 39)*.

To provide context on the scale of contribution of these movements to Telford and Wrekin's emissions, it is important to note that only the first three movements in the table account for 4% or more of total vehicle kilometres travelled on car trips wholly within Telford and Wrekin in the morning peak (4.6%, 4% and 4% respectively).

In total, the 10 movements account for approximately 35% of vehicle kilometres on car trips wholly within Telford and Wrekin in the morning peak (and just under 20% of total car vehicle kilometres within Telford and Wrekin including inbound, outbound and through trips). This highlights that **emissions are dispersed and derived from multiple sources. The overall contribution of any individual movements to boroughwide emissions is limited**.

Key car movements into and out of Telford and Wrekin

Table 10 and Table 11 provide further detail on the main sector to sector movements into and out of Telford and Wrekin. Table 10 shows the ten movements generating the most car vehicle kilometres in the morning peak on movements into Telford and Wrekin from the external sectors beyond the borough.

Origin sector	Destination sector	Vehicle kms/ hour	No of trips/ hour	Av Trip Length (km)
18) North Shropshire	1) Central T&W	6,550	245	27
18) North Shropshire	12) Hollinswood, Randlay, Stirchley & Brookside	5,270	160	33
24) West Midlands	1) Central T&W	5,040	95	52
27) South West	9) Telford Town Centre	4,760	80	61
18) North Shropshire	11) Madeley & Halesfield	4,630	130	35
17) Shrewsbury	1) Central T&W	4,180	150	28
24) West Midlands	12) Hollinswood, Randlay, Stirchley & Brookside	4,070	85	48
14) South East Shropshire	1) Central T&W	3,970	175	23
15) Rural Central Shropshire	1) Central T&W	3,930	185	21
24) West Midlands	9) Telford Town Centre	3,770	80	48

Table 10: Top 10 movements into Telford and Wrekin from external sectors, morning peak (car veh kms): Source TSTM analysis

Table 10 indicates that six of the top ten movements into Telford and Wrekin in the morning peak originate in sectors in Shropshire. The destination sectors within Telford and Wrekin indicate that trips from Shropshire are likely to be made to Telford and Wrekin for employment and other services and activities. This reflects the urban nature of Telford and Wrekin relative to the largely rural nature of Shropshire. Average trip lengths for movements from Shropshire to Telford and Wrekin are mid-range at between 20 km and 35 km.

The West Midlands sector is another important origin for vehicle kilometres into Telford and Wrekin in the morning peak; accounting for three of the top ten movements. In this case the large numbers of vehicle kilometres are the result of fewer trips than the Shropshire movements, combined with longer average trip length of around 50 km.

Table 11 shows the top ten movements out of Telford and Wrekin to the external sectors.

Origin sector	Destination sector	Vehicle kms/ hour	No of trips/ hour	Av Trip Length (km)
1) Central T&W	23) Wolverhampton & Southern South Staffordshire	4,260	155	28
1) Central T&W	24) West Midlands	3,710	70	52
1) Central T&W	29) East Staffs, East Midlands, North of England & Scotland	3,320	25	133
1) Central T&W	18) North Shropshire	3,210	145	22
1) Central T&W	17) Shrewsbury	3,120	110	28
11) Madeley & Halesfield	14) South East Shropshire	2,800	215	13
10) Dawley, Lawley, Lightmoor	15) Rural Central Shropshire	2,790	130	21
1) Central T&W	15) Rural Central Shropshire	2,710	140	19
10) Dawley, Lawley, Lightmoor	23) Wolverhampton & Southern South Staffordshire	2,700	105	26
6) Newport	18) North Shropshire	2,610	135	19

Table 11: Top 10 movements from Telford and Wrekin to external sectors, morning peak (Car veh kms) (Source TSTM analysis)

Table 11 shows that the vehicle kilometres on the top ten sector to sector movements out of Telford and Wrekin in the morning peak are the result of varying trip numbers and short, mid, and long-distance trip lengths, with average trip lengths varying between less than 15 km and nearly 135 km. Consistent with the movements into Telford and Wrekin, most of the destinations for the top ten movements are in Shropshire or the West Midlands area.

The single movement generating the most vehicle kilometres is Central Telford and Wrekin to Wolverhampton & Southern South Staffordshire. This movement has a relatively short average trip length (28 km) and a large number of trips per hour. In contrast, the third largest movement in terms of vehicle kilometres generated is from Central Telford and Wrekin to North of England and Scotland. In this case the vehicle kilometres are the result of a small number of trips combined with a long average trip length (of nearly 135 km).

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