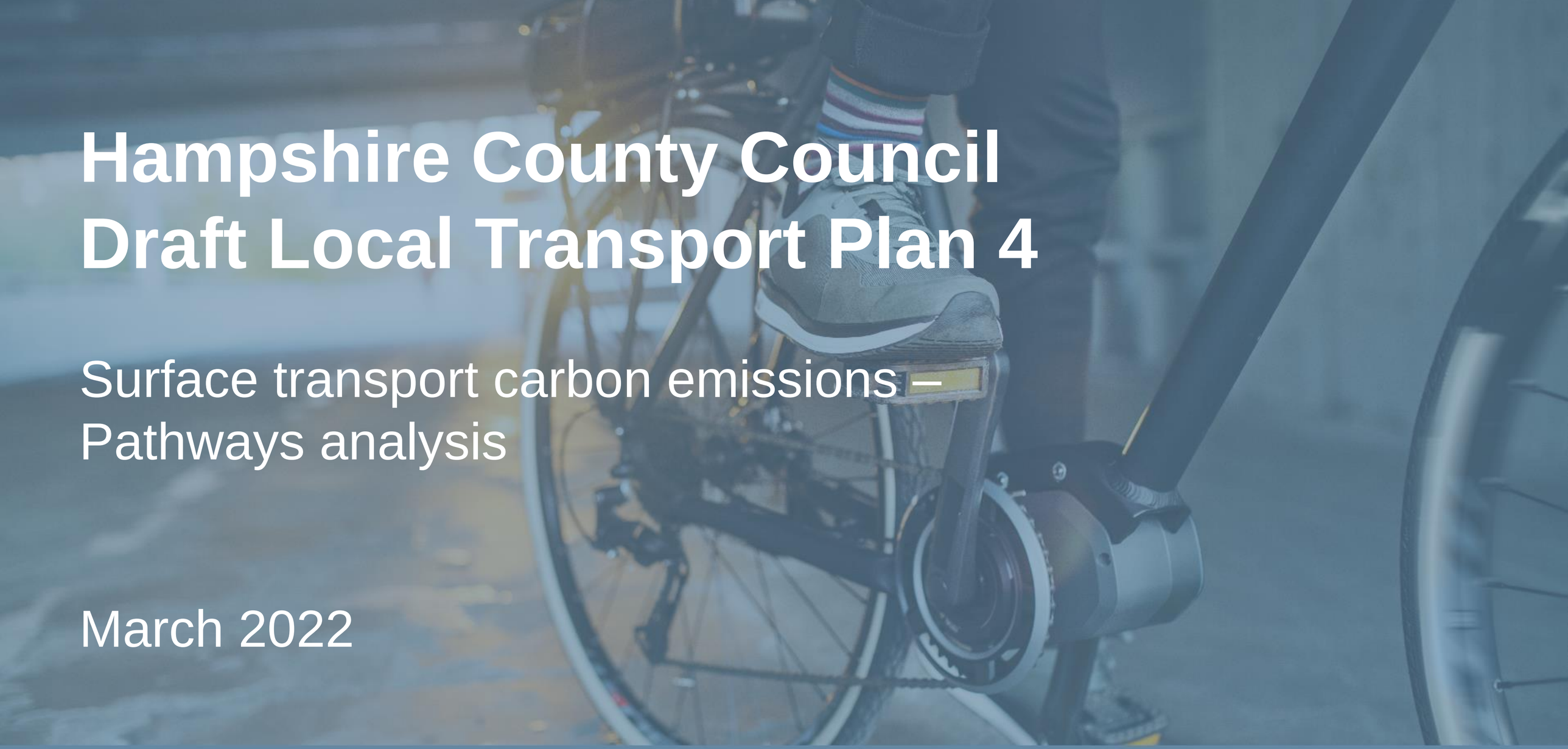


Hampshire County Council Draft Local Transport Plan 4

Surface transport carbon emissions – Pathways analysis

March 2022

Hampshire County Council

Contents

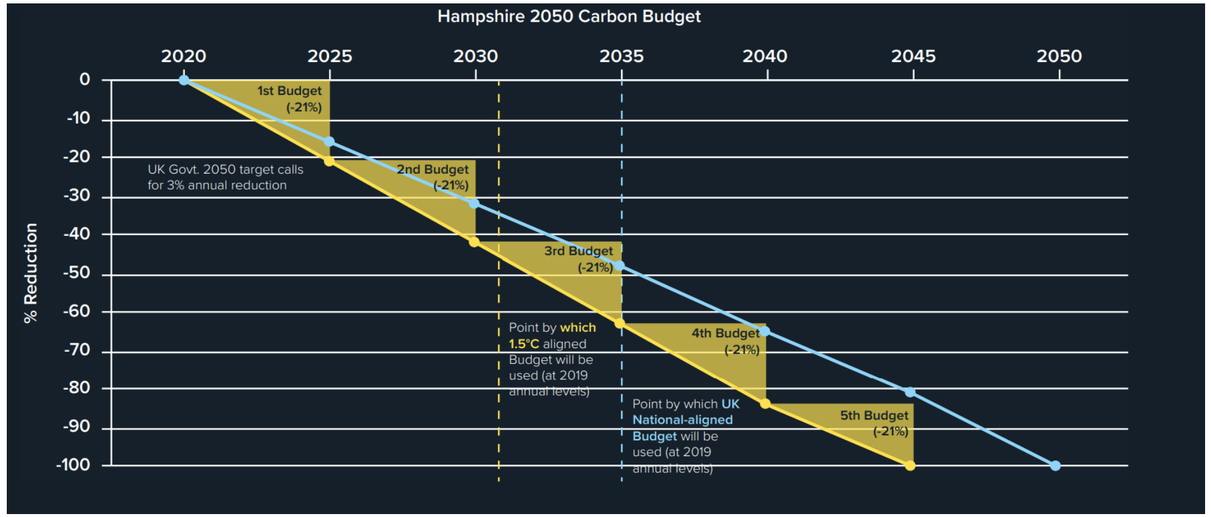
A. Overview
B. Carbon calculator analysis
C. The scale of the carbon challenge
D. Source of transport carbon emissions
E. Type of local transport measures required to close the gap
F. Background data on underlying assumptions

Section A
Overview

Overview

- This slide deck provides a **summary of transport carbon forecasts and analysis** undertaken to support the development of the LTP4.
- The analysis was undertaken to provide an understanding of:
  - the **current 'baseline' pathway** for surface transport carbon emissions* to 2050;
  - the difference or **'gap' between the baseline and the carbon reduction pathways** needed to meet Hampshire's Net Zero commitments as set out in the County's Climate Change Strategy, 2020 to 2025 (shown in the graph);
  - the **contribution of different types of vehicles and trips** to transport emissions; and
  - the potential **contribution of local action transport measures** in closing the gap.

Climate Change Strategy – Emissions reductions pathways



** Surface transport includes road (car, light goods vehicles, heavy goods vehicles and bus) and rail travel. Carbon emissions refer to carbon dioxide equivalent emissions produced by vehicles, considered on a 'well to wheel' basis i.e. accounting for emissions associated with producing and distributing fuel/energy as well as direct, tailpipe emissions from vehicle use.*

Overview

- There are four further sections in the slide deck, structured in terms of the tasks above and providing an overview of:
  - the **carbon calculator and assumptions** used for the analysis (Part B);
  - the **scale of the transport emissions challenge** in Hampshire (Part C)
    - i.e. the gap between the baseline and target decarbonisation pathway;
  - the **source of surface transport emissions** in Hampshire (Part D)
    - by trip type, vehicle type and road type; and
  - the potential scale of **carbon reduction impact of different policy types** and measures (Part E).

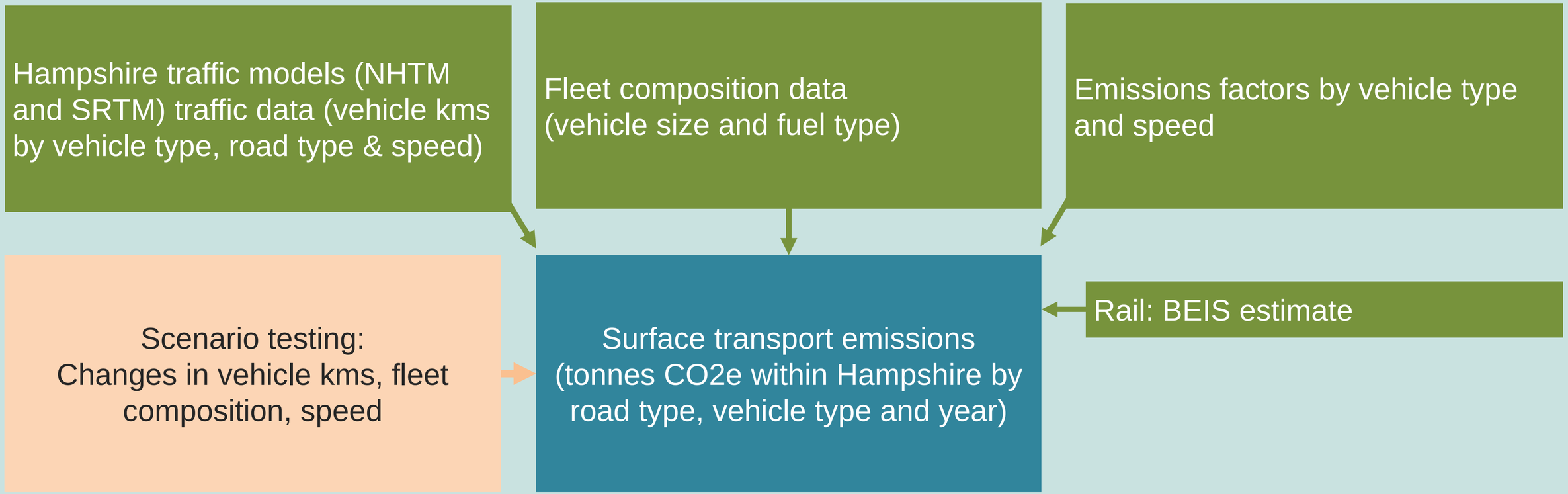
- Finally, Part F summarises the **background data and underlying assumptions**.

Section B
Carbon calculator analysis

LTP Carbon Calculator

The flow chart provides a broad overview of the carbon calculator developed and used for the study:

- the green boxes represent inputs (further details on the next slide);
- the blue box is the output of surface transport emissions per year; and
- the orange box indicates that the calculator was developed to enable a range of sensitivity tests (e.g. different assumptions on vehicle fleet) to be undertaken quickly.

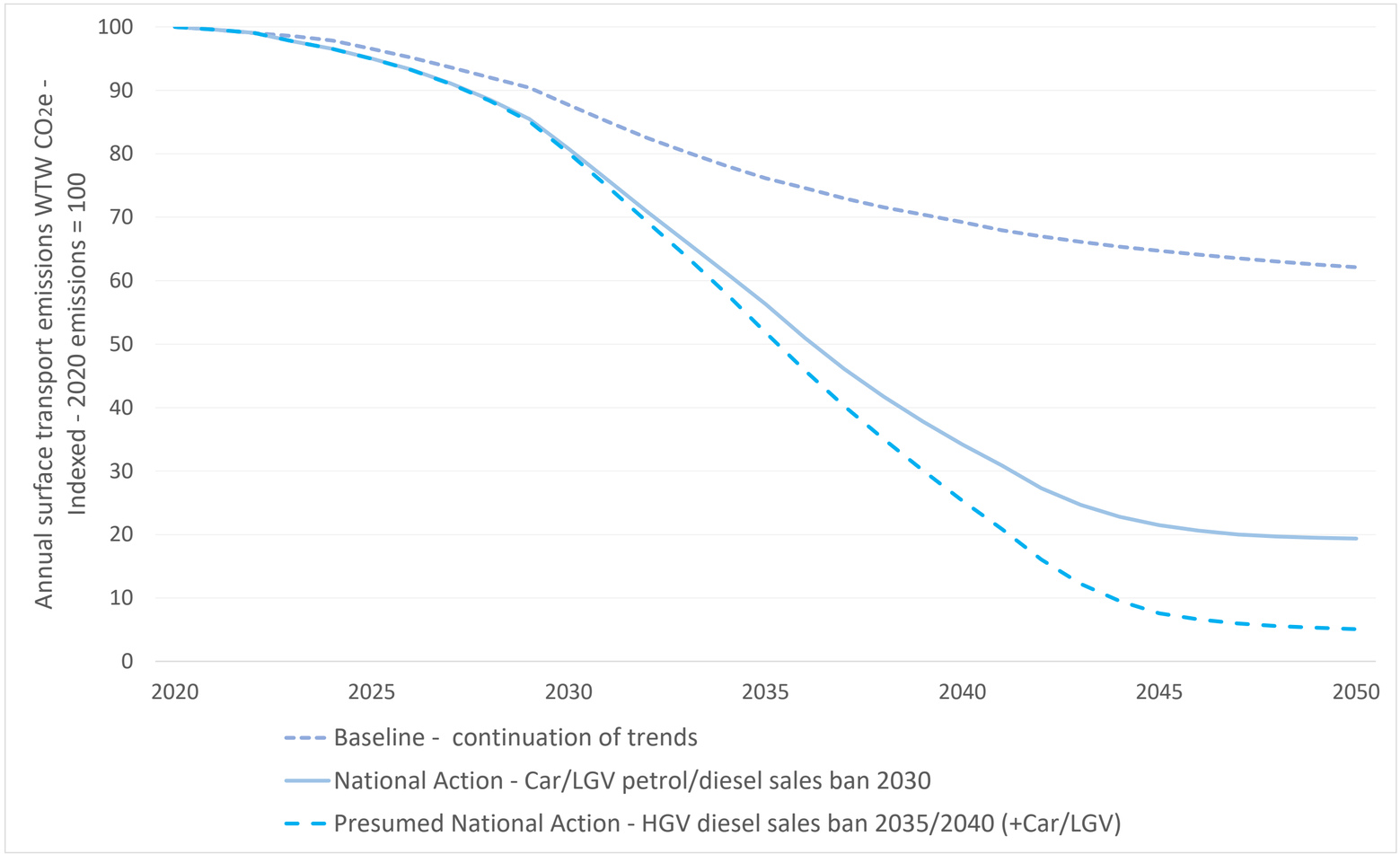


Carbon calculator approach

- The **baseline carbon calculator** was developed using:
  - **Traffic data** from Hampshire transport models (NHTM and SRTM) - reference case
    - vehicle kms by vehicle type, road type and speed band at 5 year intervals (pre COVID forecasts)
    - uplift for minor roads that weren't included in the modelling (based on GIS analysis, OS mapping and DfT traffic counts)
  - **Fleet composition** data:
    - DfT TAG data (NAEI) and SMMT forecasts of electric vehicle uptake (see notes for sources)
  - **Emissions factors**
    - well to wheel CO_2e emissions factors (g/ vehicle km by vehicle type by speed band)
      - from TAG databook and underlying data (from COPERT)
    - BEIS projections on decarbonisation of the electricity supply.

- The **main baseline outputs** included:
  - emissions by year, for comparison against the target decarbonisation pathways;
  - disaggregation by road type, vehicle type, trip purpose and distance band.

LTP Carbon Calculator – forecast surface transport emissions baseline (WTW CO_2e, indicative)



- The graph shows forecast surface transport emissions in Hampshire in three scenarios.
- All include the **same traffic growth assumptions**:
  - the reference case from the traffic models, based on pre COVID forecasts.
- The scenarios **differ in terms of forecast vehicle fleet:**
  - The top line is based on current DfT TAG assumptions and assumes steady improvement in vehicle efficiency and some electrification but does not include ban on petrol and vehicle sales.
  - The middle line illustrates the potential impact of a ban on petrol and diesel car and van sales in 2030 (as announced by Government in November 2020).
  - The lowest line adds a view of the additional impact of the ban on diesel HGV sales from 2035 /2040 (varying by size) as announced by Government in Nov. 2021).
- The **sales bans have a substantial forecast impact** on emissions particularly in the 2030s/2040s.
- Views vary on the timing and scale of impact. The forecast shown for cars was produced by the Society of Motor Manufacturers and Traders in June 2021[1] and the forecast for HGVs is based on data from the CCC's 6th Carbon budget report[2]. Other forecasts, both more and less optimistic, also exist.

1 - SMMT (2021). SMMT new car market and parc outlook to 2035, by powertrain. 11 Jun 2021.
2- CCC (2020), 6th Carbon Budget

Section C

The scale of the carbon challenge

Decarbonisation pathways

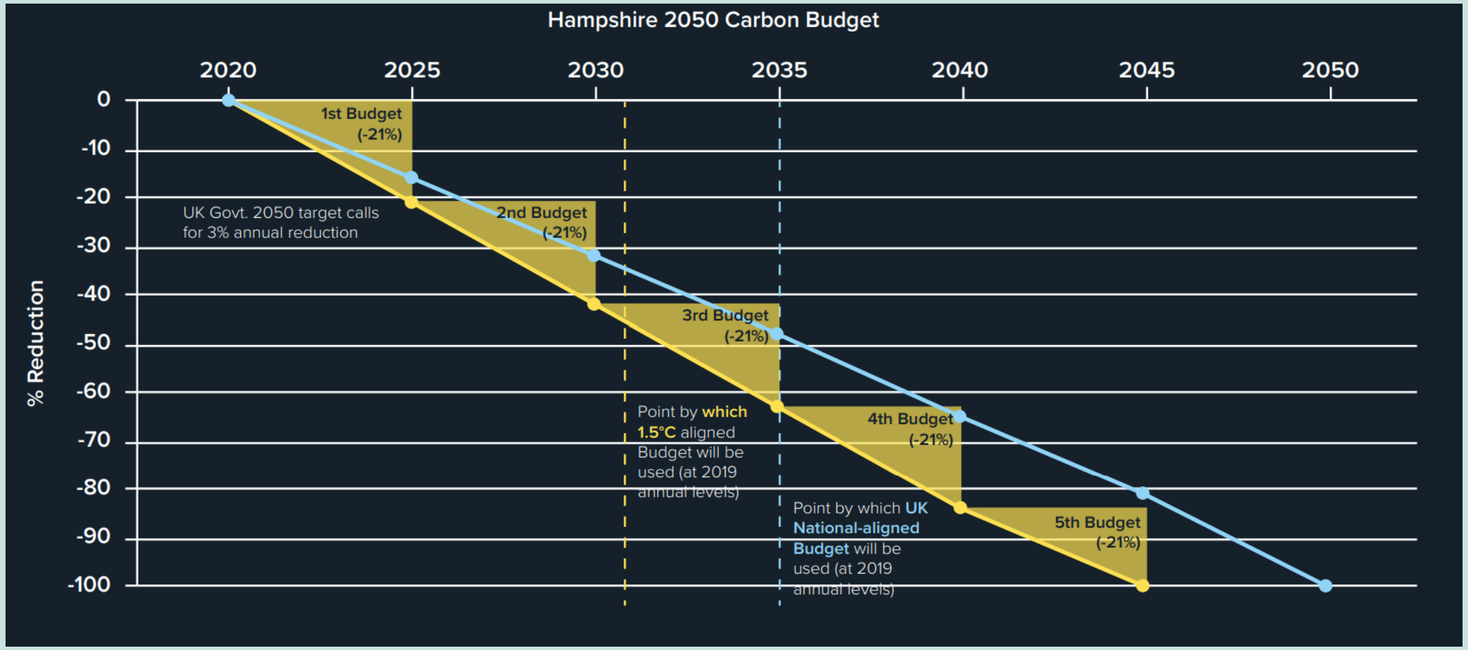
Net Zero targets and carbon budgets

- The Hampshire Climate Change Strategy (CCS) makes it clear that Hampshire's carbon commitments relate not only to **achieving Net Zero by 2050** but also to **limiting total cumulative carbon emissions** over the time period to 2050 **to within a 'carbon budget'** (an upper limit to total emissions over a time span).
- Cumulative emissions are the best metric of influence on climate change because carbon and other greenhouse gases stay in the atmosphere for decades causing global warming (increases in average temperature) and therefore climate change.
- This means that it is **cumulative emissions between now and 2050 that will determine Hampshire's influence on climate change** (rather than annual emissions in a target year).
- **Rapid reductions in emissions are therefore needed** to limit cumulative emissions, temperature increases and climate change.
- This means that the decarbonisation pathway taken to reduce emissions to Net Zero by 2050 (i.e. the rate at which emissions are reduced) is more important than the target itself.

Decarbonisation pathways

- The figure below from Hampshire's CCS shows two decarbonisation pathways for Hampshire (for all sectors).
- The **yellow line** represents the rate of emissions reduction (decarbonisation) needed if Hampshire is to contribute fairly to levels of decarbonisation required to limit average global temperature growth to close to 1.5C (compared to pre industrial times). The associated emissions reductions needed to meet each 5 year budget are also shown.
- The **blue line** shows a linear decarbonisation pathway to Net Zero in 2050 which is more closely aligned with the emissions reduction requirements of limiting temperature growth to 2C.
- This aligns with decarbonisation pathways identified by the Climate Change Committee (CCC) when the CCS was written in 2019.
- Since the CCS was written there has been further emphasis (particularly from the IPCC[1]) on the **importance of limiting temperature growth to be closer to 1.5C** to avoid triggering the most severe climate change impacts.

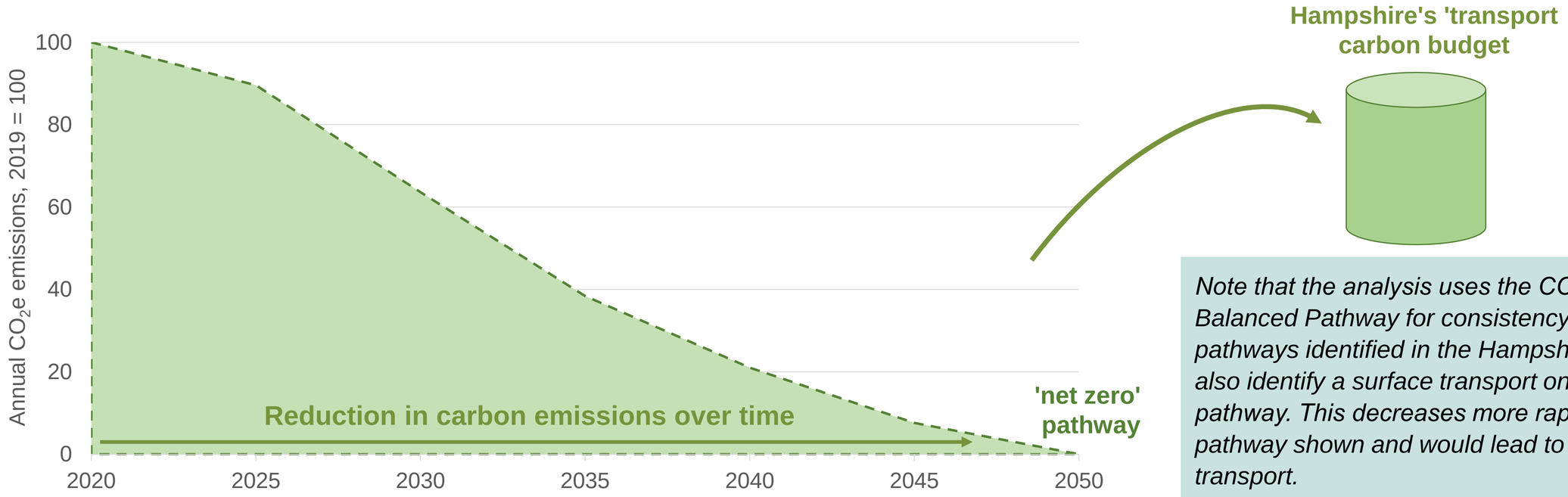
Hampshire's Climate Change Strategy – Emissions reductions pathways



1 – Intergovernmental Panel on Climate Change (2021) IPCC Working Group 1 Report on the Physical Science Basis of the Sixth Assessment

Decarbonisation pathways

- The CCC published a 6th Carbon Budget report for the UK[1] in December 2020, including a Balanced Pathway to Net Zero that is aligned with the emission reductions required to limit temperature growth to 1.5C.
- This Balanced Pathway has been used as the target decarbonisation pathway for the transport emissions gap analysis for this work.
- The graph below shows the decarbonisation pathway and the cumulative emissions associated with it, i.e. Hampshire's implied surface transport carbon budget.



Note that the analysis uses the CCC's 'all sector' Balanced Pathway for consistency with the all sector pathways identified in the Hampshire CCS. The CCC do also identify a surface transport only decarbonisation pathway. This decreases more rapidly than the 'all sector' pathway shown and would lead to a smaller budget for transport.

1 - Climate Change Committee (2020), 6th Carbon Budget

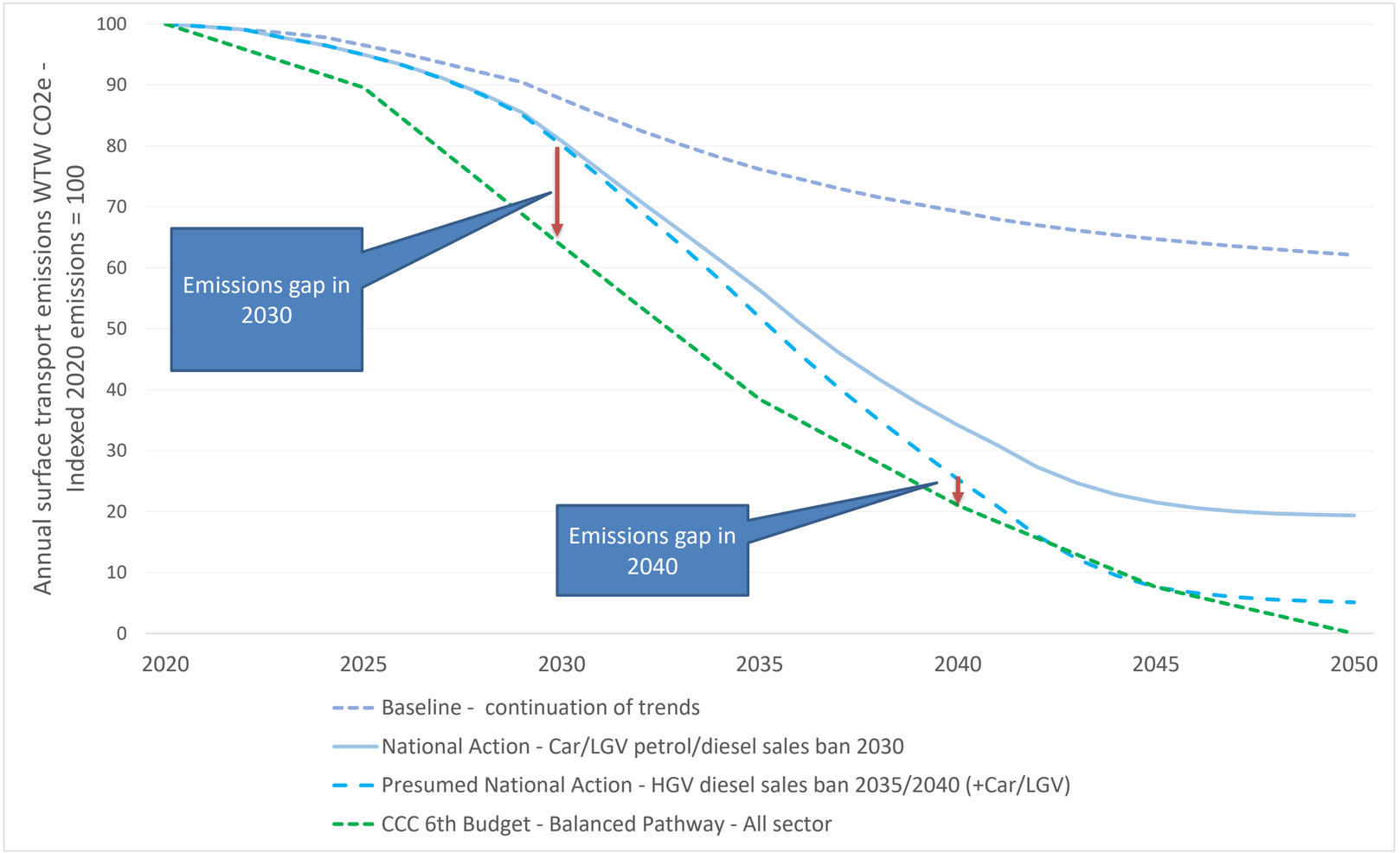
Identifying the emissions gap

- The following graphs show the baseline forecast surface transport emissions in Hampshire by year, alongside the CCC Balanced Pathway for decarbonisation that the emissions would need to follow to contribute to Hampshire's carbon reduction commitments.

- Comparison between the baseline forecasts and decarbonisation pathway shows the 'emissions gap' that needs to be closed to meet climate change commitments.

- In subsequent slides, each pathway is also shown in terms of cumulative emissions by year to highlight the points at which carbon budgets are exceeded.

Emissions gap - Hampshire 'surface transport emissions baseline (WTW CO_2e, indicative) compared against target decarbonisation pathways



- The graph shows that the national action to ban sales of petrol/diesel vehicles are forecast to have a significant impact on surface transport emissions, bringing them close to the target decarbonisation pathway by the 2040s.
- However the bans have limited impact in the 2020s and early 2030s, leaving a significant emissions gap between the forecast emissions and pathway as shown by the red arrow.
- Exceeding the decarbonisation pathway in the 2020s and 2030s will make it impossible to meet the overall carbon budget for Hampshire (see next slide).

Key

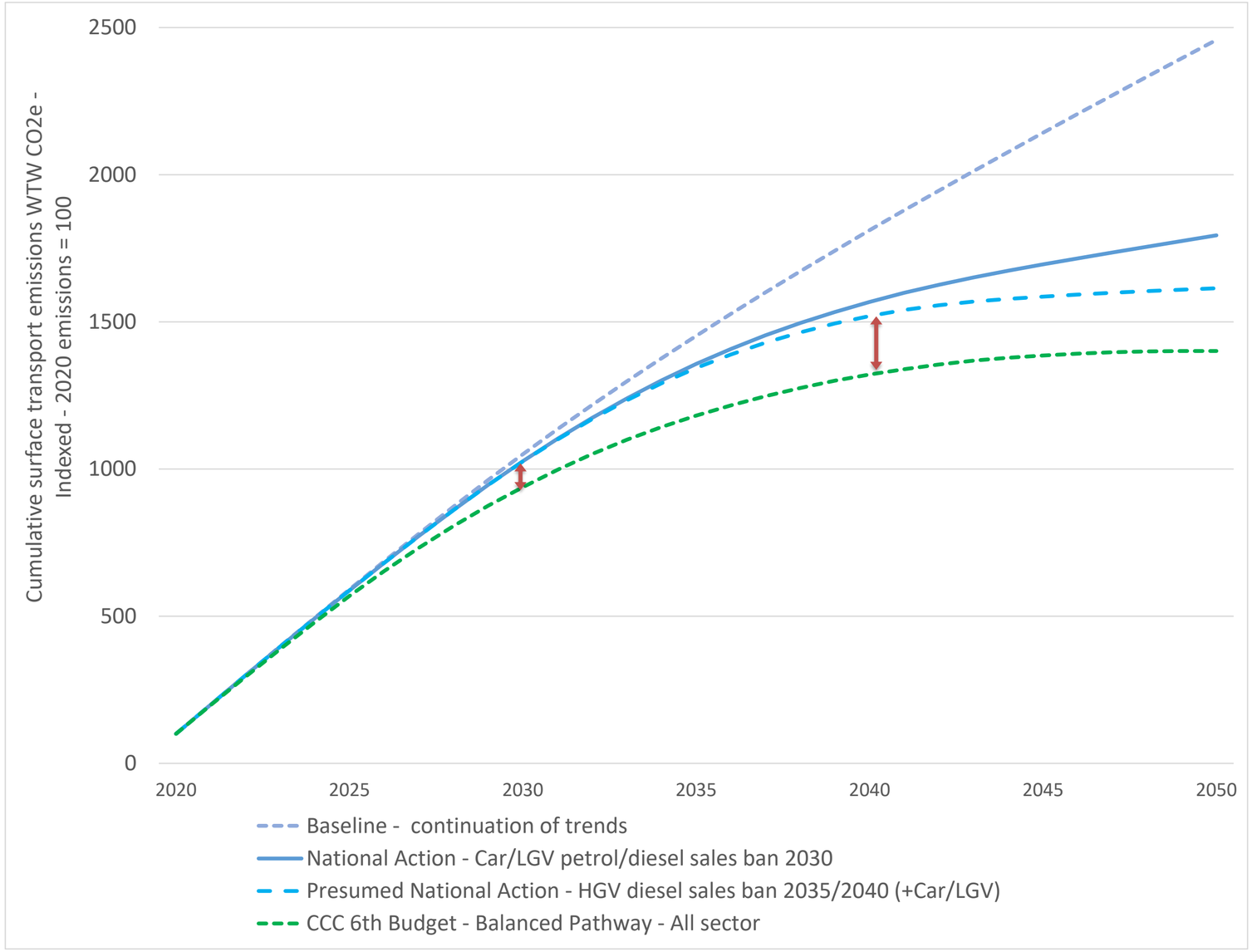
Target pathway

- *CCC 6th Budget – Balanced Pathway to Net Zero produced by CCC.*

Surface transport emissions baselines: *NHTM/SRTM reference case traffic growth + varying fleet assumptions:*

- *Baseline = current DfT TAG assumptions, derived before petrol/diesel car/van sales bans introduced, reflect some improvement in efficiency and some electrification.*
- *National Action– estimate of how a ban on petrol/diesel cars/van sales in 2030 may effect fleet composition through time – based on SMMT forecasts.*
- *Presumed national action– estimate of how a ban on diesel HGVs in 2035/2040 might affect fleet composition through time – based on CCC 6th carbon budget information.*

Emissions gap – Hampshire's cumulative surface transport emissions baseline (WTW CO_2e, indicative) compared against target decarbonisation pathway



- The cumulative emissions associated with each scenario/pathway show clearly how a gap between the baseline and national action scenarios builds up in the 2020s and 2030s .
- The gap stops growing in the 2040s but is not closed despite the significant uptake of EVs in the national action scenarios.

Key

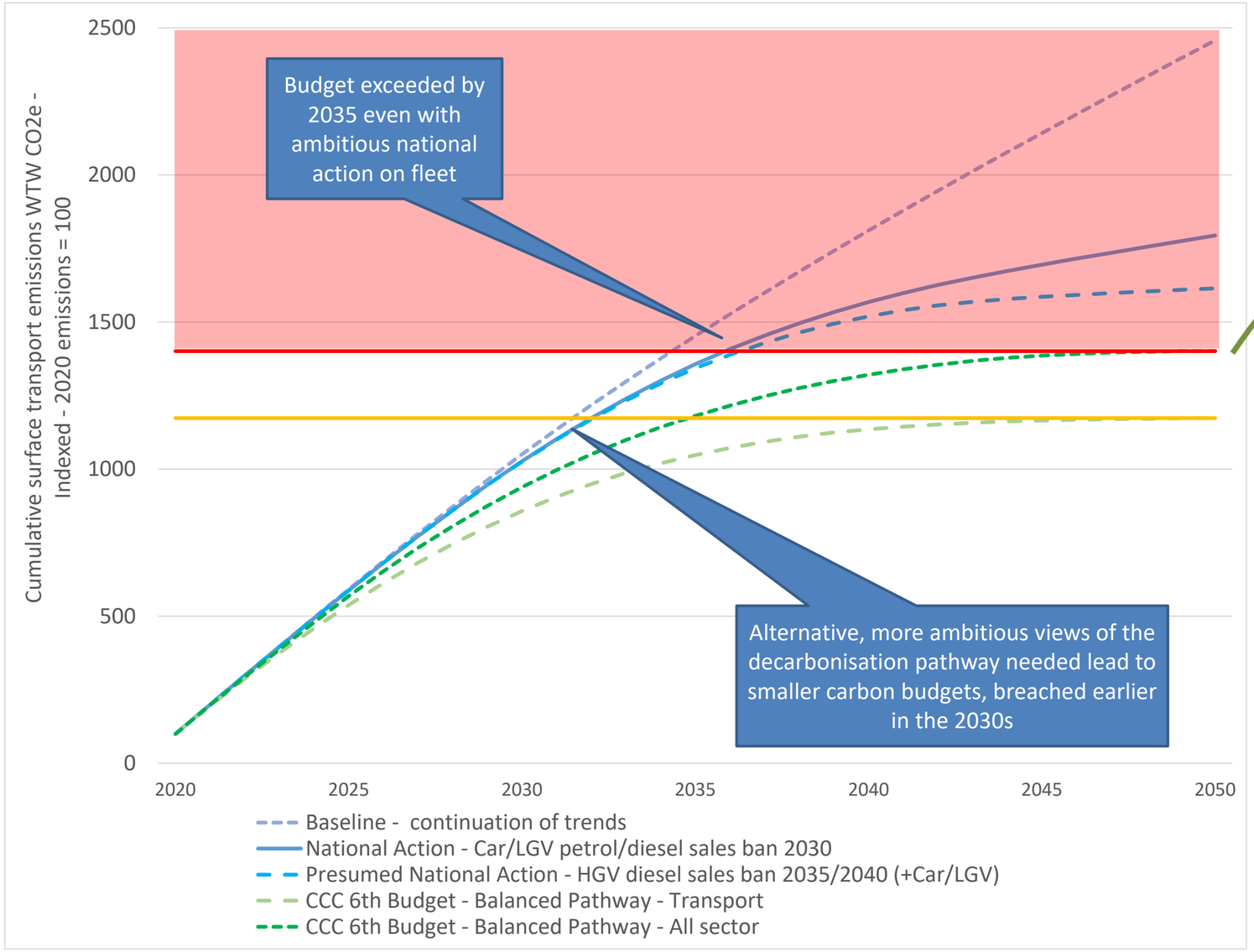
Target pathway

- *CCC 6th Budget – Balanced Pathway to Net Zero produced by CCC*

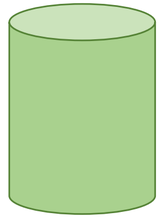
Surface transport emissions baselines: *NHTM/SRTM reference case traffic growth + varying fleet assumptions:*

- *Baseline = current DfT TAG assumptions, derived before petrol/diesel car/van sales bans introduced, reflect some improvement in efficiency and some electrification*
- *National Action– estimate of how a ban on petrol/diesel cars/van sales in 2030 may effect fleet composition through time – based on SMMT forecasts*
- *Presumed national action– estimate of how a ban on diesel HGVs in 2035/2040 might affect fleet composition through time – based on CCC 6th carbon budget information.*

Emissions gap and budget - Hampshire cumulative surface transport emissions baseline (WTW CO_2e, indicative) compared against carbon budget



Upper limit of Hampshire's transport carbon budget reached by 2050



- The horizontal red line highlights the upper limit of the carbon budget for Hampshire's surface transport - showing that it is forecast to be exceeded by 2035 in the national action scenarios represented.
- For reference, the graph also includes the more ambitious CCC Balanced Pathway for surface transport alone, showing the implications of a lower carbon budget that is exceeded sooner.

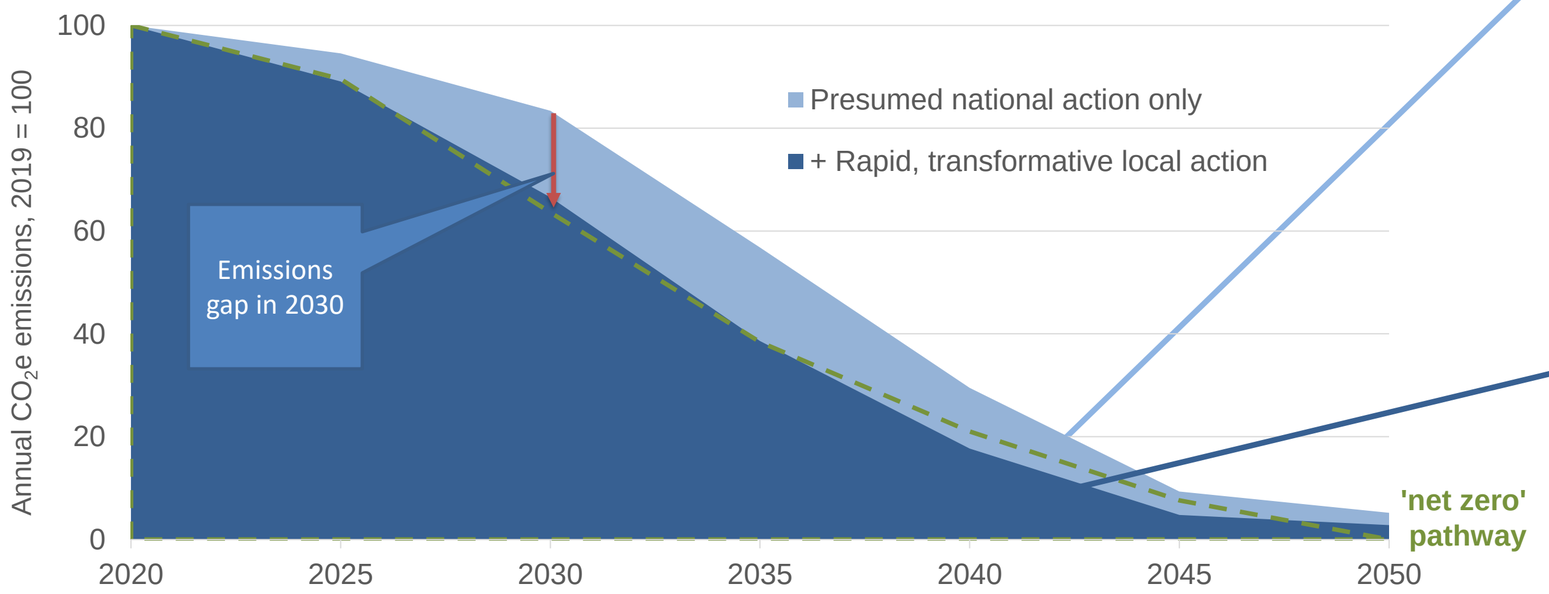
The need for transformative local action

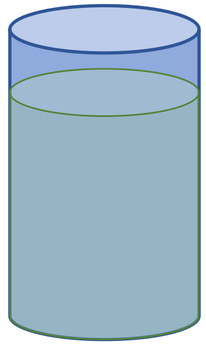
The graph below represents the forecast emissions in the national action scenario against the target decarbonisation pathway to highlight the need for transformative local action in the LTP to close the emissions gap.

2020 - 2030: 'National action' scenario assumes gradual shift to electric cars, vans and buses; but not sufficient to deliver carbon reduction pathway. **Local action needed.**

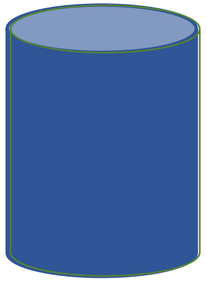
2030 – 2040: National ban on sale of new petrol and diesel cars and vans from 2030 would reduce emissions substantially during this period; but **carbon budget would still be exceeded if we rely on national action alone**.

2040 – 2050: Remaining emissions are largely due to HGVs. The DfT has set out **national action to convert the HGV fleet to zero emissions vehicles by 2050**. If successful, remaining emissions will reduce rapidly through the 2040s.





Budget exceeded by ~20% by 2050, based on national action alone



~100% of budget used by 2050, based on national action + rapid, transformative local action

Note that the analysis is based on the overall carbon reduction Balanced Pathway identified by the CCC for emissions from all sectors combined. The CCC assumes a steeper pathway for surface transport nationally in the 2020s and a smaller overall budget to contribute to the overall Balanced Pathway. Achieving this smaller surface transport budget would require even more ambitious action at both the local and national level, including measures to ensure very rapid uptake of EVs.

The need for transformative local action

- The above graph indicates that **closing Hampshire's transport emissions gap and meeting its carbon budget** will rely on **ambitious national action** to support uptake of zero emissions vehicles in the car, van and HGV fleet.
  - This reflects commitments to ban sales of petrol and diesel cars and vans by 2030 and HGVs by 2035/2040 (depending on vehicle size) as set out in the DfT's recent Transport Decarbonisation Plan and in commitments made at the time of the Glasgow COP in November 2021.
- However, the **national fleet action is not enough on it's own** as fleet change is too slow (av. car life is 14 yrs).
- **Rapid and transformative local action will also be needed** in order to:
  - achieve the carbon pathway over the next 10 years; and
  - keep total carbon emissions broadly within the carbon budget by 2050.
- Some 'carbon off-setting or removals' may also be required, although the CCC indicate that the surface transport sector should aim to reach as close to 'absolute zero' as possible as removal opportunities will be required by other sectors that are harder to decarbonise.
  - Removals involve planting vegetation to absorb carbon from the atmosphere, or using technology to capture and store carbon. However, this technology is currently at an early stage, and focused on trials.

*The next sections look further at the **type of measures that would contribute to transformative local action** to reduce transport emissions. Section D looks at the source of current emissions by trip type and vehicle type, and Section E summarises analysis undertaken using the carbon calculator to estimate the impact of measures on emissions.*

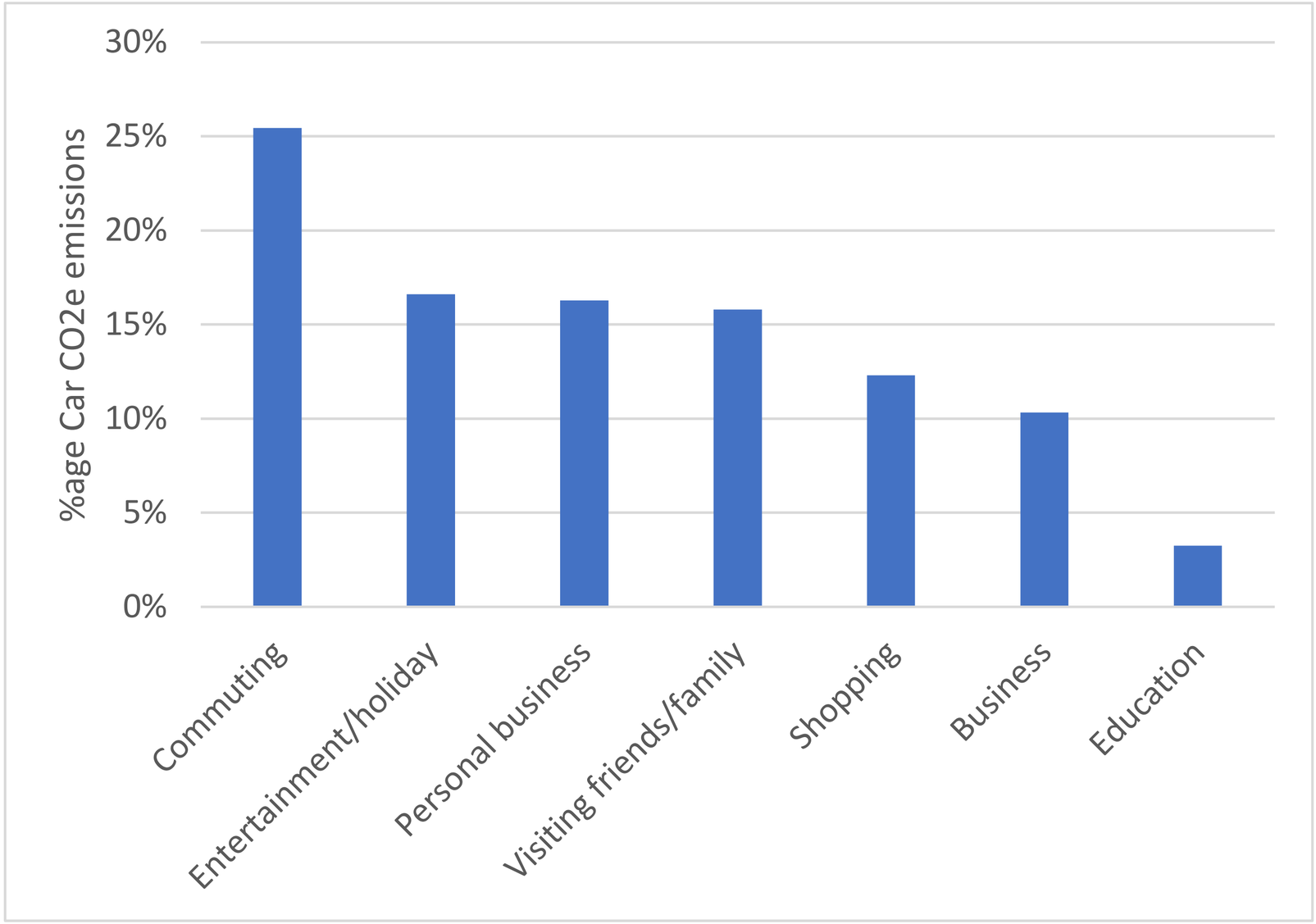
Section D
Source of transport carbon emissions

Disaggregation of baseline emissions

- **In order to take action to reduce transport emissions, to close the gap between forecast emissions and the target decarbonisation pathway,** it is important to have a good understanding of the types of trip that generate the most emissions. This helps to identify the types of measures that would be required to reduce carbon emissions.

- **The following graphs provide indicative estimates of the breakdown of baseline surface transport emissions.** The following disaggregations are shown:
  - purpose (car emissions);
  - journey length (car emissions);
  - vehicle type (road emissions);
  - road type (road emissions).

Hampshire baseline car emissions (WTW CO_2e, indicative) by purpose

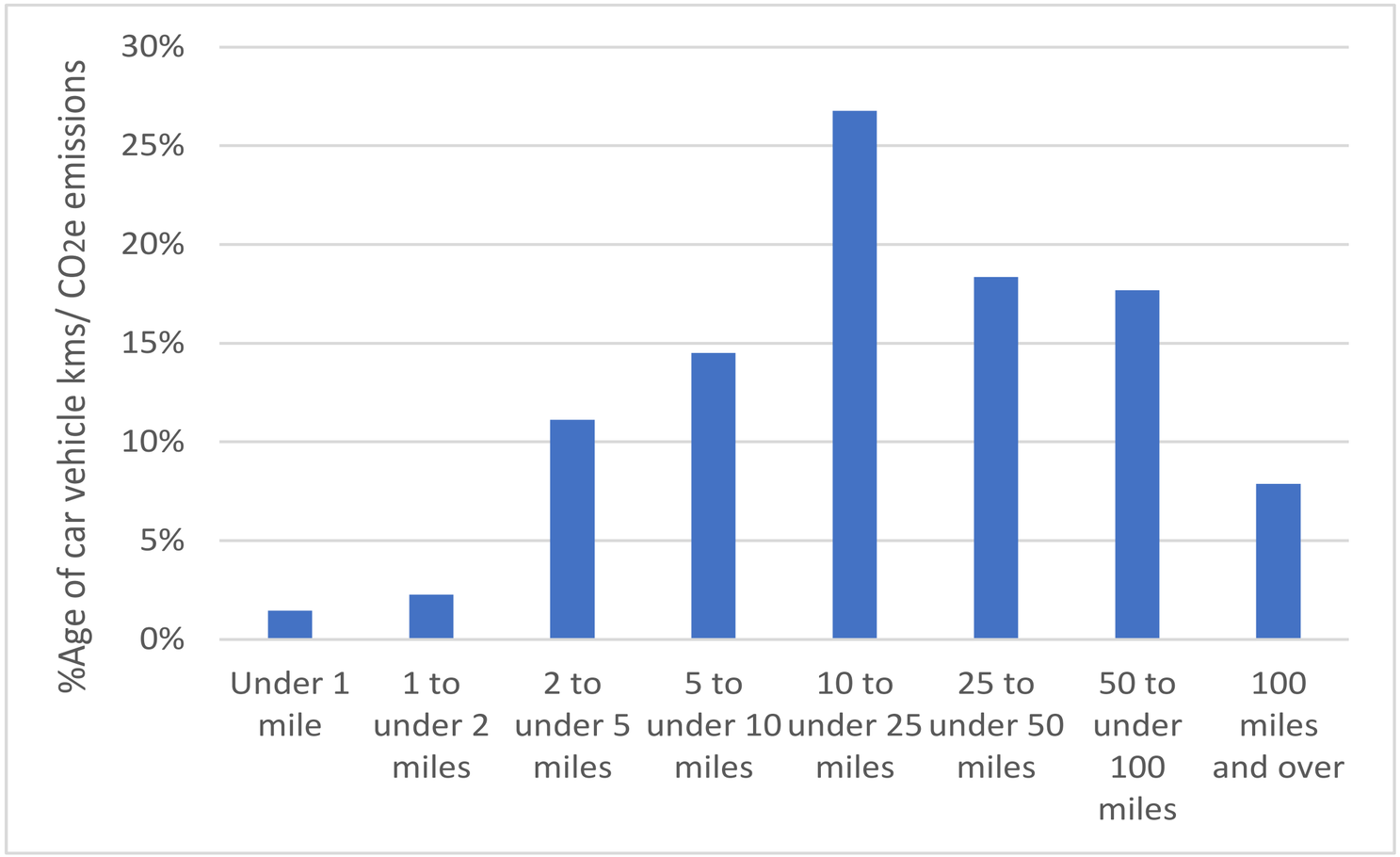


- Pre-COVID19, commuting accounted for approximately 25% of car kms and emissions.
- The short length of education trips mean that they account for <5% of car kms and emissions despite high trip numbers.

Proportions are based on NTS data on trips and average trip length by journey purpose.

Constant average emissions rates (gCO2e/vehicle km) are assumed, in the absence of detailed information on the variation in travel speed.

Hampshire car emissions (WTW CO2e, indicative) baseline by distance band

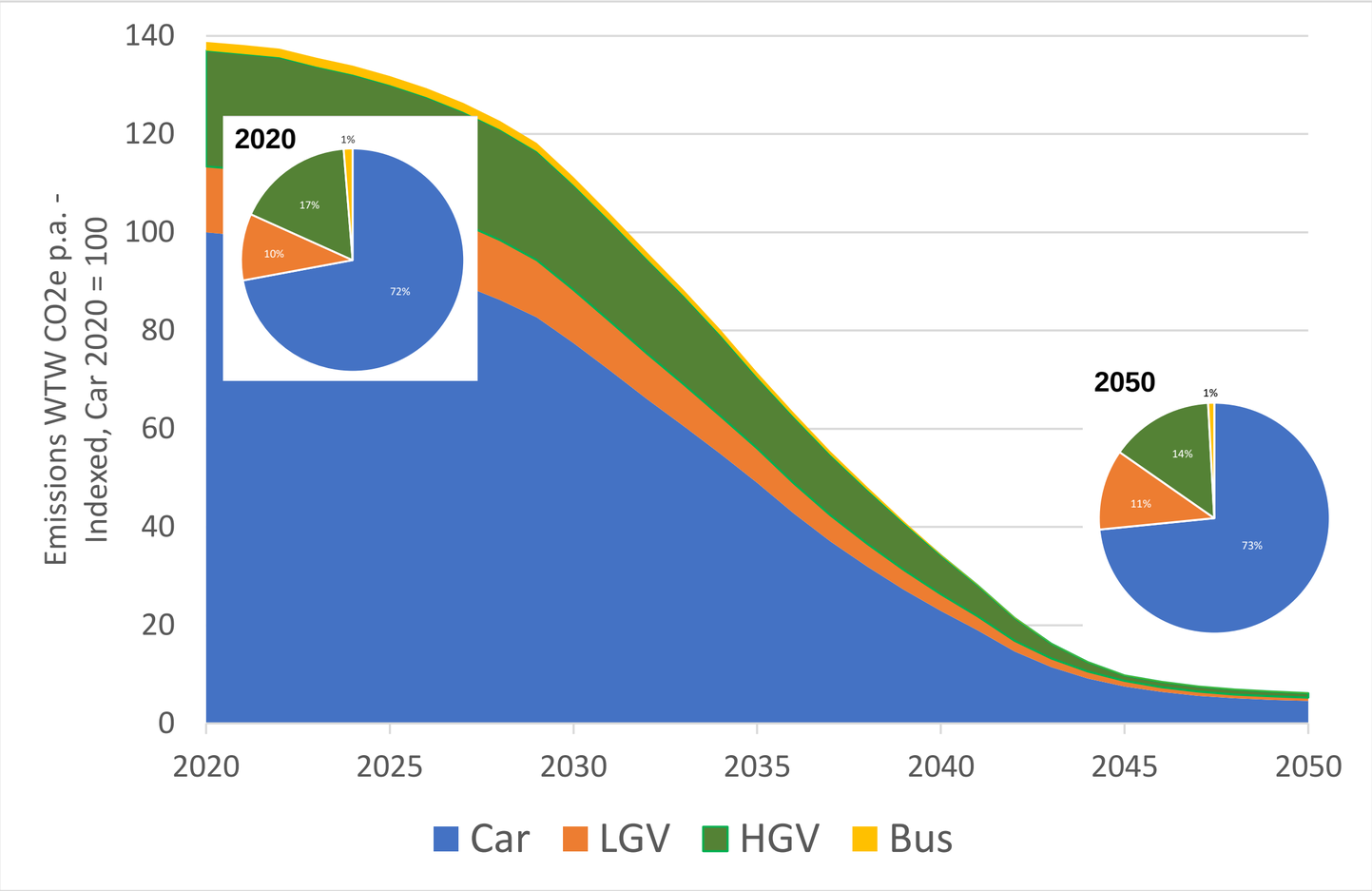


- Trips over 10 miles long account for over 70% of car vehicle kms and emissions despite accounting for <20% of trips

Proportions are based on NTS data on trips and trip length.

Constant average emissions rates (gCO2e/vehicle km) are assumed, in the absence of detailed information on the variation in travel speed.

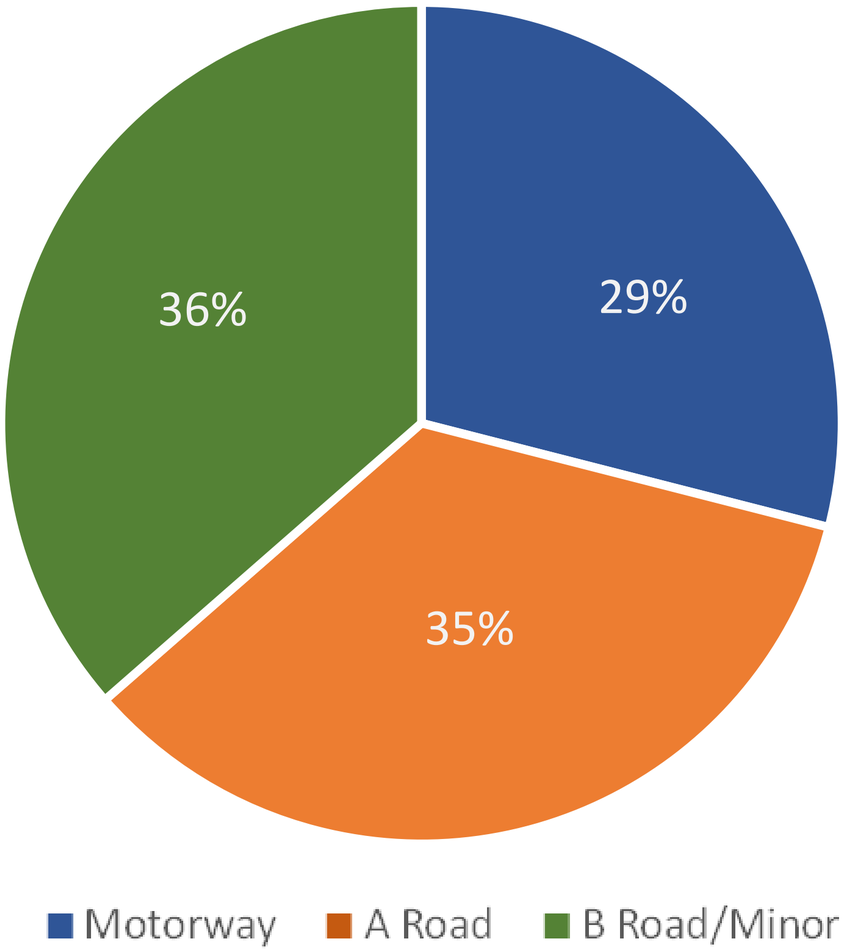
Hampshire surface transport emissions baseline (WTW CO2e, indicative) by vehicle type



- Cars dominate emissions accounting for over 70% in 2020 and 2050.
- Goods vehicles (HGVs, LGVs) account for about 25% of emissions.
- Buses account for <1% emissions throughout.

Based on data on vehicle flows by vehicle type from NHTM and SRTM.

Hampshire surface transport emissions baseline (WTW CO2e, indicative) by road type



- Emissions are fairly evenly split between Motorways, A roads and more minor roads within Hampshire.
- The balance alters slightly through time with the changing balance of emissions by vehicle type. In particular motorways account for a higher proportion in later years when HGVs account for a higher proportion of emissions.

Based on data on vehicle flows by road type from NHTM and SRTM.

Section E

Types of local transport measures required to close the emissions gap

Potential local transport emissions reductions measures

- To help to understand the **balance of local measures likely to be needed** to close the emissions gap, the ‘carbon calculator’ was used to estimate the indicative impact of a range of potential local emission reductions measures.
- Analysis focussed particularly on **measures to reduce emissions from passenger transport** (car, private LGV, bus and rail travel) and the change needed to close the emissions gap for passenger transport only.
  - This approach reflects the main area of influence of the LTP.
  - If the scope was expanded to consider the measures required to close the emissions gap for the freight sector too, greater action in the passenger transport sector would be likely to be needed as the freight sector is recognised to be particularly challenging to decarbonise.
- Identification of **potential emissions reductions measures** was structured on the basis that transport emissions are the product of:
  - ‘vehicle kilometres travelled’ x ‘emissions per vehicle kilometre travelled’.
- Measures to reduce emissions therefore need to:
  - **reduce vehicle kilometres**, and/or
  - **reduce emissions per vehicle kilometre**.

Potential local emissions reductions measures

Potential measures were identified in terms of the Avoid-Reduce-Replace-Offset Carbon Management Hierarchy from Hampshire's Climate Change Strategy:

Category	Emissions reduction approach
Avoid 	Lessen the amount of overall travel (reduced trip numbers and/or length due to logistics, land use planning, online activities).
Reduce 	Reduce dependency on the private car and increase the proportion of travel by the most efficient modes: walking, cycling, shared and public transport.
	Increase vehicle energy efficiency and efficiency of network operation and driving styles.
Replace 	Move to alternative, less carbon-intensive fuel/energy sources.

Reduce vehicle kilometres

Reduce emissions per vehicle km

Potential emissions reduction measures by policy area

Policy Area	Types of measure	Impact
Improved digital connectivity	Support excellent broadband connectivity Support online service/activity provision	Avoid
Planning for living locally	Develop 20 minute neighbourhoods Require transit focussed development	Avoid + Reduce (Mode Shift)
Active mode/ micro-mobility provision	Support mode shift through new routes, supporting services, hire schemes	Reduce (Mode Shift)
Public/ shared transport provision	Support mode shift through improved, reliable, affordable services integrated with shared transport and car sharing via Mobility Hubs and MaaS	Reduce (Mode Shift)
Demand management	Level up costs between modes e.g. parking charges. Speed limits. Space reallocation.	Reduce (Mode Shift)
Road network efficiency	Use data to support managing smooth, efficient traffic flow and training and monitoring instruments to encourage efficient driving style. Localised alleviation of congestion hotspots – without increasing flow	Reduce (Efficiency)
Acceleration of EV uptake	Accelerate beyond national average uptake Encourage corporate fleet, support EV car clubs and smaller vehicle use. Require taxi and bus fleet update.	Replace

Assessment of indicative impact of local emissions measures

- As a first step, **to understand scale of potential impact,** the carbon calculator was used to estimate the impact if a range of measures across all policy areas was introduced on a substantial scale, countywide.
- **The estimates were indicative of potential** and based on:
  - evidence available from literature on potential scale of impact by type of trip;
  - revisions in the calculator to number, trip length by mode, travel speed band and/or fleet composition;
  - application of changes to appropriate categories of emissions (by vehicle type, purpose, distance band etc) *e.g. digital connectivity might reduce commuting by 10%, and business trips by 10%, but be partly offset by an increase in leisure trips (although these are likely to be shorter especially if in conjunction with localisation).*
- **The assumptions were based on a literature review**, using sources including the following:
  - BEIS Carbon Calculator MacKay Carbon Calculator - UK emissions and primary energy consumption (beis.gov.uk),
  - CCC 6th Carbon budget supporting papers Sixth Carbon Budget - Climate Change Committee (theccc.org.uk),
  - International Transport Forum Climate Action Directory, Transport Climate Action Directory | ITF (itf-oecd.org).
  - LGA decarbonising transport papers Decarbonising transport | Local Government Association,
  - Natcen for DfT, 2021, Switching to sustainable transport: Rapid Evidence Review Switching to sustainable transport: a rapid evidence assessment - GOV.UK (www.gov.uk),
  - Propensity to Cycle Tool (PCT) Welcome to the Propensity to Cycle Tool (PCT)
  - RTPI, Net Zero Transport, January 2021, RTPI report on Achieving Net Zero Transport (tps.org.uk),
  - Transport for Quality of Life, Decarbonising Transport Transport and Climate Change | Transport for Quality of Life
  - UKERC and CREDS decarbonising transport papers, Transport & Mobility – CREDS,
- It is important to note that **views and assumptions vary widely between sources**.

Local action – balance of measures required

- The illustrative tests highlighted the important **role for rapid local action** in closing the gap between baseline emissions and the target decarbonisation pathways, requiring the use of policy measures.
- The role for local action was identified to be **particularly important in the 2020s and early 2030s** as local measures can take effect before national fleet action has had significant impact.
- Analysis then focussed on the measures that would be required to **close the emissions gap in 2030** between the ‘presumed national action scenario’ and the ‘target decarbonisation pathway’(as shown in Slide 15).
- The next slide shows one potential route to closing the gap, based on the following assumptions and scope:
  - the presumed national action scenario is as illustrated in Slide 15;
  - the **focus is on passenger transport emissions** only (car, LGV for private use, bus and train),
    - i.e. the assessment is identifying the action required to close the gap between forecast passenger transport emissions, assuming the presumed national action scenario outlined above and the annual passenger transport emissions required to follow the target decarbonisation pathway. Reductions in freight emissions are not considered;
  - the **CCC Balanced Pathway to Net Zero** is the target decarbonisation pathway (using the all-sector pathway).
- This analysis suggests that the **emissions gap in 2030 could be broadly closed** by rapid and ambitious local action to:
  - accelerate EV and smaller vehicle uptake by 18 months to 2 years ahead of the national average; and
  - achieve approximately a 10% reduction in car vehicle kms.

Summary of a potential route to closing the emissions gap for passenger transport in Hampshire in 2030: Indicative scenario

Required reduction in passenger transport carbon emissions:

Approx. 35% reduction in passenger transport carbon emissions is required between 2019-2030

Two potential sources of emissions savings:

Reduction in carbon emissions per vehicle-kilometre

Reduction in total car kilometres travelled

This could be achieved through the following indicative changes*:

National action to change the fleet to zero emissions vehicles. Balances out the emissions impact of business as usual traffic growth to 2030 and reduces emissions per km by a further ~15% to 25%.

Local action to accelerate uptake of EVs and use smaller vehicles could reduce average emissions per km by a further 5% to 10%; with further small savings (~1%-2%) potentially delivered by measures to smooth traffic flows

In addition, a 10% reduction (approx.) in total car vehicle kilometres travelled will be required to meet the 2030 target. A 10% reduction in car use split evenly between the 5 main types of reduction measure would involve:

Avoiding carbon-intensive activities

- **Reducing trip lengths** e.g. 20% reduction in the length of 10% of car trips (assuming average trip length)
- **Removing trips** e.g. replacing 2% of trips (average trip length) with online activity.

Reducing dependency on the private car

- **Increasing cycling** by approx. 150% to 200% **and public transport use** by approx. 15% to 20%
- **Sharing** approx. 4% of car trips (assuming average trip length)

National action

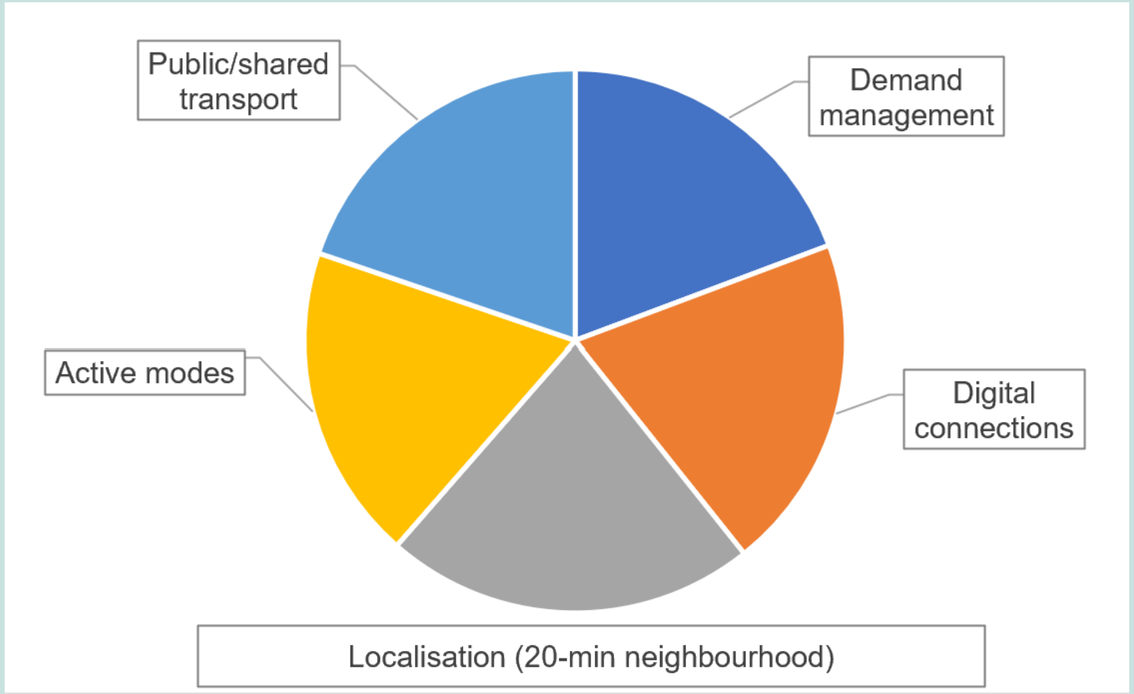
Rapid, transformative, local action

Local action – assumptions and influences on scale of action required

- It is important to note that different assumptions and definitions of scope of the emissions gap would lead to different conclusions on the scale of local action required to those discussed above.
- For instance, the estimated 10% reduction in car vehicle kilometres required would be altered by:
  - Using **different forecasts of the impact of the national action on fleet**. Both more and less optimistic forecasts exist than the ones used. For instance, the CCC 6th Carbon Budget Balanced Pathway assumes more rapid uptake of EV cars, particularly in the 2020s, which the SMMT suggest would need more support for EV purchase than currently exists. If the forecasts transpired, the need for local demand measures would be reduced (although local action to support EV uptake would play an important role in achieving the forecasts).
  - **Including freight transport** in the estimate of the emissions gap to be closed. As freight is challenging to decarbonise, this would lead to a need for greater reductions in passenger transport emissions to close the overall gap.
  - Using **different assumptions around demand growth in future**. This analysis assumes an increase in car traffic between 2019 and 2030 of nearly 20%, based on pre-Covid-19 assumptions from the Hampshire transport models.
  - Using an **alternative view of the target decarbonisation pathway** e.g. the CCC Surface Transport sector Balanced Pathway to Net Zero which is more challenging than the all-sector pathway used (selected for consistency with the all-sector pathway identified in the Hampshire Climate Change Strategy).

Local Action – the role of demand management

Indicative contribution of local policy tools in achieving the required 10% reduction (approx.) in total car vehicle kilometres between 2019 and 2030



- The analysis above focussed on the changes in behaviour that would contribute to reductions in car vehicle kms (e.g. mode shift, localisation).
- Given the scale of change required, measures to level up the balance in cost and convenience between car use and sustainable modes are also likely to be required, alongside measures to make the alternatives more attractive.
- Achieving the scale of %age impacts given needed to reduce car vehicle kms by 10% or more is likely to need some form of demand management.
- The pie chart shows an indicative contribution of demand management to total vehicle km reduction, in a scenario with a similar balance to the example on flow chart above (details on assumptions provided on next slide).
- Demand management reduces veh km by increasing the scale of response to the other measures (e.g. cycle schemes)

- The relative impacts of each measure type in the chart reflects the likely scale of measures in place by 2030, and the proportion and length of car trips affected. It is important to note that the balance shown is indicative only as:
  - views and assumptions on impacts of policy areas vary considerably between sources;
  - boundaries between policy areas not clear cut and they interact (e.g. localisation can cause a shift to cycling);
  - the balance will change through time e.g. PT is likely to become more significant as services continue to evolve.

Local Action - assumptions behind pie chart on previous slide

- **Active modes**: assumed extensive roll out of cycle provision, including e-bikes, and associated significant increase in willingness to cycle – leading to cycling trips increasing by nearly 200% across all purposes – consistent with the ‘Go-Dutch’ scenario in DfT’s Propensity to Cycle Toolkit (PCT), adjusted to account for relative levels of cycling for different journey purposes.
- **Public and shared transport**: based on the estimated impact on car vehicle kms of increasing patronage by up to 15-20% between 2019 and 2030 or introducing car share on up to 5% of trips.
- **Localisation**: assumes an average reduction in trip length of approximately 5% for shopping, personal business and leisure trips through more local trips and more linking trips for different purposes, e.g. taking a child to school and then continuing to work).
- **Improved digital connections:** assumes improved provision of broadband connectivity in homes and local work hubs and improved provision of online opportunities, leading to approximately a 5% reduction in commuting, business and shopping trips. Allowing for some rebound effect (due to increased time availability), there is assumed to be no net decrease in leisure and personal trips.
- **Demand management**: assumes strong parking measures (more expensive and less convenient locations) and Workplace Parking Levy in urban areas by 2030 leading to increased parking costs (walking and charge) equivalent to on average 50% of total car trip costs (varying by trip length) for 25% of commuting and business car trips and 10 to 15% of other purposes. An equivalent effect could also be achieved through a road user charging scheme. The impact on vehicle kilometres occurs largely as a result of increased response to the other measures shown e.g. active travel improvements.

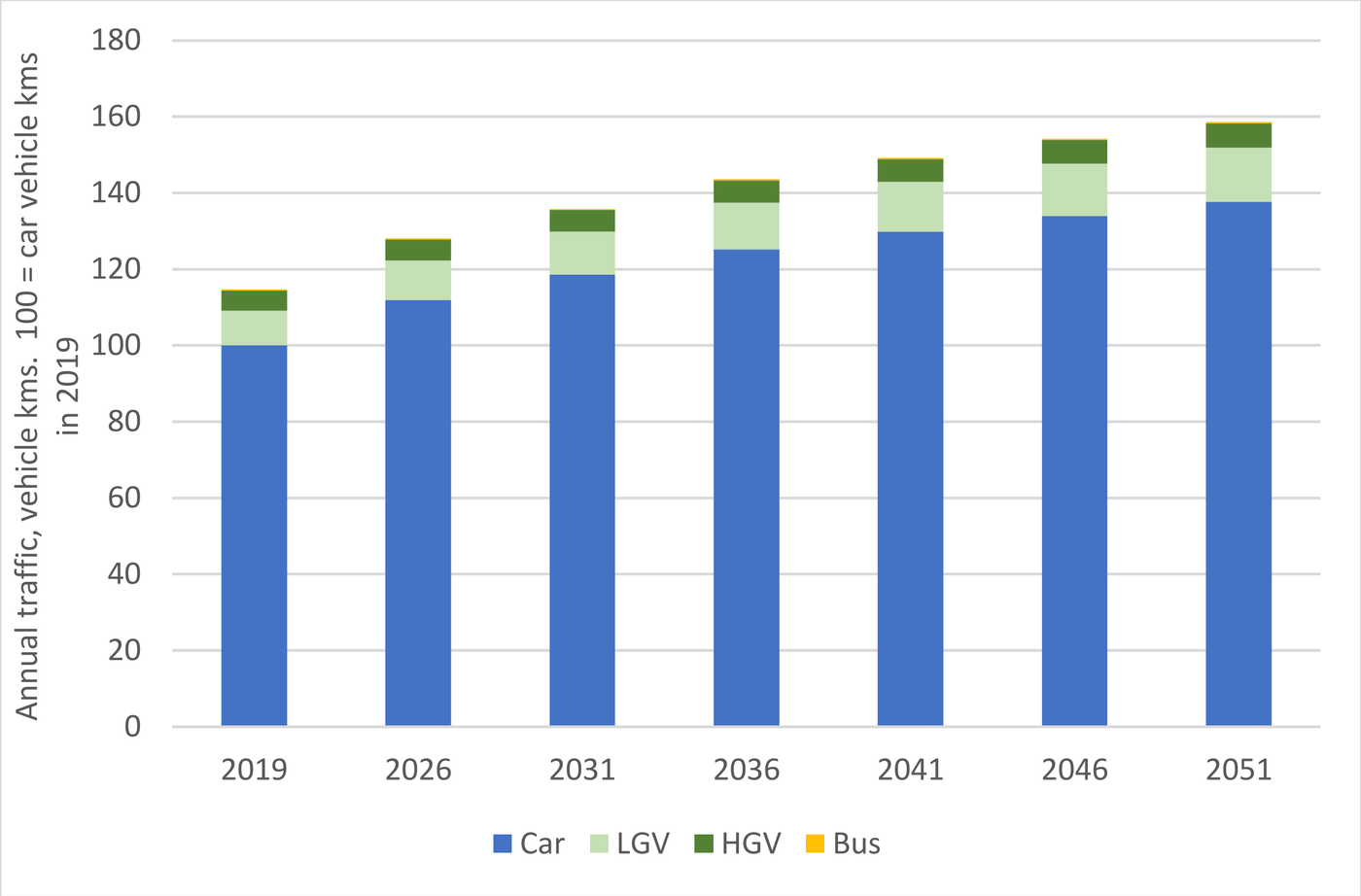
Key points about local action required to meet carbon pathways

- National action on **accelerating EV use** is important and ambitious but **not enough on its own**
  - closing the emissions gap will also require rapid, ambitious local action.
- **Significant further local change is required**, **rapidly**
  - the 2020s/early 2030s are the most challenging time, where the gap is greatest.
- **Combinations of measures** can have **mixed impacts**, both:
  - targeting the same trips, reducing overall impact and/or working together and amplifying impacts.
- **Smaller personal vehicle use** can play a significant role in reducing emissions.
- A marked **reduction in vehicle kilometres** is required to close the gap for passenger transport emissions.
- **Demand management is likely to be required** to achieve the scale and pace of change needed.
- **Freight is particularly challenging** and will need co-ordinated national action.
- Measures can bring benefits for **wider benefits for other objectives**.

Section F

Background data on underlying assumptions

Background traffic growth in baseline scenario, indicative



- Growth 2019 to 2036 based on SRTM and NHTM (previous version) Reference Cases using data for the modelled years 2019, 2026 and 2036 based on pre COVID-19 assumptions.
- Interpolation between modelled years and growth beyond 2036 based on DfT National Road Traffic Forecasts 2018, S1 Reference Scenario.