

CARBON ASSESSMENT PLAYBOOK

BASELINE SCENARIOS &
PATHWAYS GUIDANCE NOTE



1. INTRODUCTION

The Carbon Assessment Playbook (CAP) presents different baseline scenarios and transport decarbonisation pathways in the baseline dashboard, reports and the policy builder.

Baseline scenarios represent different estimates of how emissions might change up to 2050 in the absence of further local intervention. This provides a reference against which the impact of the policy scenarios (i.e. potential Local Transport Plan interventions) can be measured. The uptake of Zero Emission Vehicles (ZEVs) will be the most influential intervention reducing transport emissions and will primarily be driven by national policies (though critically enabled by delivery of local charging infrastructure). Business-as-Usual (i.e. DfT's TAG databook) assumptions however do not as of October 2023 account for these policies (e.g. the ZEV mandate). The three default scenarios in the CAP therefore are used to give an insight to the question of 'how quickly might the transition to Zero Emission Vehicles reduce transport emissions locally?'.

Transport decarbonisation pathways provide different interpretations of how quickly transport emissions need to fall. The UK as a whole has such a trajectory set out in the in the [Climate Change Act](#); legally binding carbon budgets which put the UK on a trajectory to achieve Net Zero by 2050. The Climate Change Committee (CCC) and Government policies such as the Net Zero Strategy set out pathways of how these carbon budgets could be achieved in each sector. None of these pathways or targets are disaggregated to a local level. However, scaling these national pathways to local baselines can provide localised transport decarbonisation pathways that offer guiding context as to what pace of decarbonisation might be needed to support national decarbonisation commitments, and how this compares to local Net Zero or carbon neutrality targets. Some local authorities have their own bespoke transport decarbonisation pathways, but many don't, and the CAP therefore provides these contextual pathways to guide ambition.

This guidance note provides an overview of these baseline scenarios and pathways; what they are, how they differ, how they can be used and what their limitations are. This guidance is intended to support users of the CAP, particularly in the tasks of understanding the 'emission gap' in their area and the extent to which proposed policies and interventions will reduce emissions in line with carbon budgets and Net Zero.

2. HOW ARE CURRENT AND FUTURE EMISSIONS CALCULATED?

Emissions in each authority have been calculated using a disaggregated network-based methodology. This extracts data from transport models and uses this to estimate carbon

emissions at a network / Local Authority level. It also provides detailed disaggregation of emissions by sources (e.g. trip length, place type).

A high-level summary of this methodology is shown in Figure 1. Full details of the methodology for this modelling and emission calculation methodology are available from the corresponding baseline dashboard produced by each Sub-national Transport Body.

Figure 1 A high-level outline of the workflow used in emission calculations

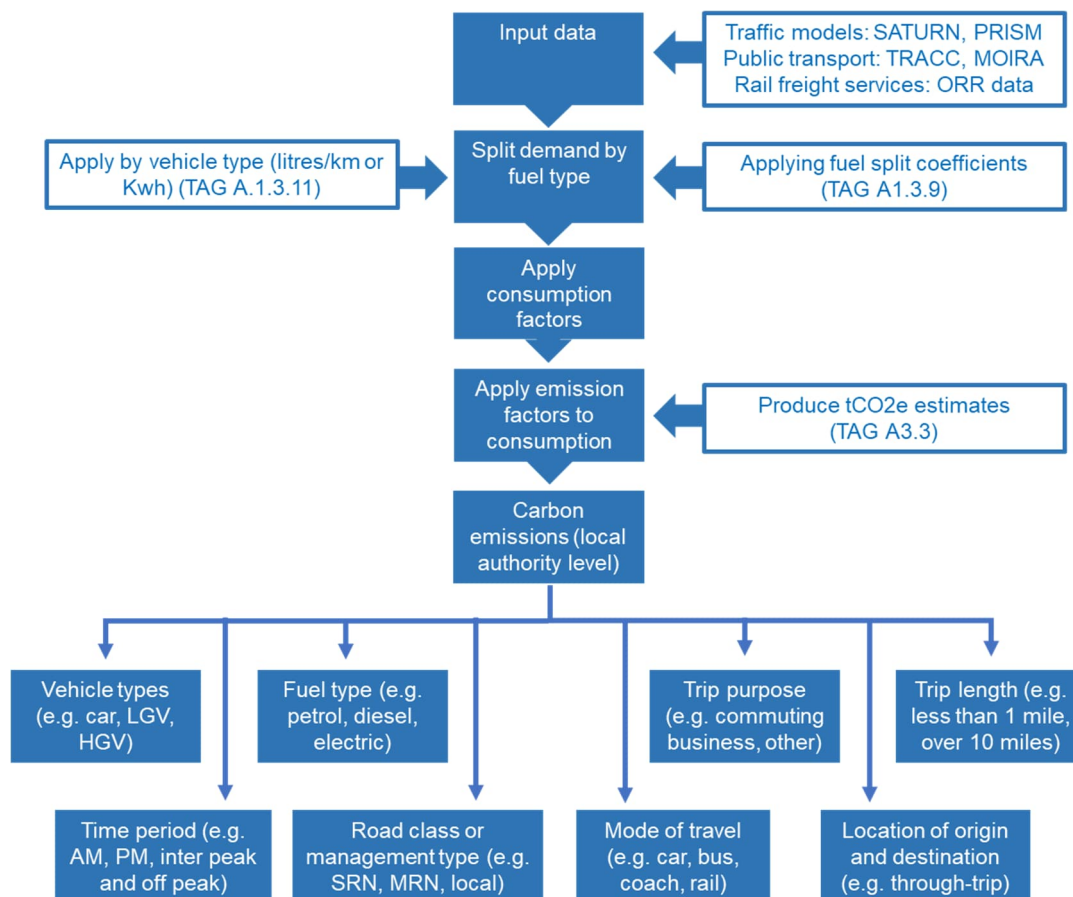


Figure 1 shows how these calculations are prepared under a Business-as-Usual scenario (i.e. largely TAG databook values). To test emissions under an alternative scenario, these datasets are swapped out for an alternative. For example, to test a scenario of accelerated ZEV uptake an alternative dataset (e.g. Common Analytical Scenario table VL1) is used in place of TAG table A1.3.9 when splitting demand by fuel type.

3. WHAT IS THE DIFFERENCE BETWEEN THE FUTURE EMISSION SCENARIOS PROVIDED?

Table 1 summaries the key differences between the three baseline scenarios presented in the baseline dashboard, report and policy builder. Shorthand metrics (e.g. UE-BaU) for each scenario are provided in line with those used in the DfT's draft Quantifiable Carbon Reduction (QCR) guidance for Local Transport Plans.

Table 1 Comparison of the baseline scenarios

Scenario	Description	Growth	Fuel consumption	Proportion of vkm by fuel type (i.e. EV uptake)
Business as Usual (UE-BaU)	A national future based on firm and funded policies	NTM	TAG A1.3.11	TAG A1.3.9
Localised scenario of accelerated ZEV uptake (UE-ZEV-LA)	A more realistic future based on expected policy (e.g. the ZEV mandate) and an assumption that charging provision continues in line with demand. This is localised to each LA; reflecting how ZEV uptake might differ based on characteristics of each place. Other variables remain as per Business-as-Usual.	NTM	TAG A1.3.11	WSP's EV:Ready analysis (Low scenario)
Accelerated ZEV (UE-ZEV)	A national scenario of ambitious ZEV uptake likely to represent a best-case scenario of ZEV uptake. Further national policies (i.e. more than the ZEV mandate and current phase out dates) would likely be necessary to realise this scenario. Other variables remain as per Business-as-Usual.	NTM / NRTP	TAG A1.3.11	CAS VL1

The difference in assumed ZEV uptake in each of the three scenarios is summarised in Table 2.

Table 2 Comparison of the proportion of miles driven by ZEVs in each baseline scenario

Scenario	2025	2030	2040	2050
Business as Usual (TAG Unit A1.3.9)	15%	36%	62%	67%
Localised scenario of accelerated ZEV uptake (WSP EV:Ready Low)*	5%-38%	20%-67%	74%-94%	95%-97%
Accelerated ZEV uptake (Common Analytical Scenario – Decarbonisation)	13%	40%	88%	99%

*the range reflects variation in percentage ownership of EVs across WSP's national forecast

These scenarios are consistent with the required (UE-BaU and UE-ZEV) and encouraged (UE-ZEV-LA) scenarios currently proposed in drafts of the DfT's QCR guidance. It should be noted that the Accelerated ZEV scenarios are relatively simple; their only difference from the Business-as-Usual scenario is different mileage split by fuel type (i.e. ZEV uptake) assumptions. It does not account for changes to fuel efficiency (e.g. trends towards heavier, less efficient vehicles or regulations to reduce fuel consumption) or changes to overall traffic growth (e.g. a 'rebound effect' of increased vkms travelled resulting from accelerated ZEV uptake and their lower operating costs).

The rationale for this is that (a) national policies are not in place to influence fuel efficiency or growth in the same way as ZEV uptake (b) it reduces complexity (e.g. more than three baseline scenarios differing by multiple parameters) and (c) avoids presenting too specific a suggestion of the future (e.g. specifying one of DfT's Common Analytical Scenarios as most likely).

If desired, additional scenario testing can be conducted using the baseline emission models to inform planning for uncertainty (e.g. test the carbon impact of a specific CAS scenario or the influence of the Covid pandemic on future travel patterns). Authorities should contact their STB to request this.

Further details of each scenario are provided below.

BUSINESS-AS-USUAL (UE-BaU)

This represents firm and funded policies in line with current TAG datasets and Core (i.e. typically NTEM 7.2) growth forecasts used in local and regional transport models.

Fleet assumptions are based on the version v1.2.1 (May 2023) of the TAG Databook (A1.3.9). This does not account for national bans on the sale of new Internal Combustion Engine Vehicles (ICEVs): a national intervention that is not yet legislated for but is expected to have a significant influence on future emissions.

ACCELERATED ZEV UPTAKE SCENARIOS

The following scenarios of 'accelerated ZEV uptake' have been used to present possible futures of accelerated ZEV uptake driven primarily by the national bans on the sale of petrol and diesel vehicles.

Both of these scenarios of accelerated EV uptake should be used to inform the potential contribution that accelerated ZEV uptake driven by national policy could have. These scenarios however must be enabled by local delivery of charging infrastructure and may fail to materialise if charging provision and other factors (e.g. grid supply) are not overcome.

Localised scenario of accelerated ZEV uptake (UE-ZEV-LA)

This represents a more realistic future based on expected policy (e.g. the ZEV mandate) and mileage split by fuel type (i.e. ZEV uptake) assumptions are specific to each Local Authority. WSP's EV:Ready analysis is used for these ZEV uptake assumptions.

EV:Ready is WSP's tool for informing transport authorities of future EV demand, supply and charging requirements. It has been used to prepare local authority forecasts of EV uptake that reflect local factors. The method utilises National Grid Future Energy Scenarios (FES) for UK based scenarios of EV uptake and weights these to reflect their relevance to the market today and forecast uptake rates until 2050. Local factors are then accounted for using data such as baseline EV ownership and sales trends, reliance on on-street parking, vehicle ownership, wider fleet and vehicle turnover trends and propensity to switch to an EV (based on socio-demographics and consumer attitude data).

This gives a High and Low forecast of percentage EV ownership as a proportion of total vehicle fleet on an annual basis up to 2050. This is bespoke to each authority. These percentages have been used in place of TAG Unit A1.3.9 in the forecasting of emissions up to 2050 (see Figure 1). This assumes percentage ownership can be used in place of percentage mileage split, which may result in less accurate estimates in some local circumstances (e.g. where an authority has low EV ownership but high EV mileage from trips originated in a neighbouring authority).

Some STB areas have separate mileage split analysis available as a consequence of separate, more detailed work undertaken using EV:Ready or other similar approaches. Whilst this is not currently included within the CAP due to the adoption of a consistent approach at a national level, further detail on this mileage split data can be requested for comparison from those STBs that have it available.

EV:Ready only provides EV forecasts for car. To reflect likely switches to zero emission technologies in LGVs and HGVs it has been assumed LGV ownership is the same as EV:Ready forecasts for car, and HGVs follow the same profile but 10 years behind. The rationale for this assumption is based on the expectation at the time of this analysis that new sales of cars and vans would be banned from 2030 and HGVs from 2040.

The High and Low forecasts reflect the significant uncertainty that exists in future EV uptake but reflects EV uptake is likely to be higher than estimated in TAG. Only the Low forecast is provided as it is considered to represent a more realistic future based on expected policy (i.e. the ZEV mandate and 2030 phase out date) and an assumption that charging provision continues in line with demand. For a scenario of ambitious ZEV uptake see the Common Analytical Scenarios.

Impact of Government Net Zero announcements in September 2023

The iteration of WSP's EV:Ready analysis used in the CAP was prepared when Government policy was for sale of new petrol and diesel vehicles to be banned in 2030. In September 2023 the Government announced this would be delayed to 2035.

It was not possible to update the analysis to account for this policy change prior to publication of the CAP in 2023. While this has the potential to mean the EV:Ready scenario provided in the CAP overestimates the uptake of ZEVs and thereby emissions, it is not considered likely to result in a significant change; the Government has confirmed its commitment to the ZEV mandate in the form it was available at the time of the EV:Ready analysis. This includes a target for manufacturers of 80% sales of electric vehicles by 2030.

This analysis may be updated in future iterations of the CAP and the baseline analysis it contains. However at this time EV:Ready Low is considered to remain a realistic future based on expected policies.

Accelerated ZEV uptake (UE-ZEV)

DfT released the Common Analytical Scenarios in August 2022 with a [databook](#) that included mileage split by fuel type for each scenario. These mileage split by fuel type assumptions were the same between the two CAS Decarbonisation scenarios: Mode Balanced and Vehicle Led. A summary of these scenarios in full can be found in DfT's [National Road Traffic Projection 2022 guidance](#).

These two scenarios include the same mileage split dataset that represent a potential future of ambitious ZEV uptake. Both are national datasets (not reflecting local differences) and are only scenarios intended to support planning for uncertainty – they are not forecasts. Further national policies (supported by a corresponding increase in local charging provision) would likely be needed to realise the pace of ZEV uptake indicated in this scenario.

4. WHAT IS THE DIFFERENCE BETWEEN THE FUTURE EMISSION PATHWAYS PROVIDED?

As noted in the introduction, in the absence of nationally disaggregated carbon budgets or locally developed, bespoke local transport decarbonisation pathways, the 'scaling' of national pathways to local baselines provides guiding context as to what pace of decarbonisation might be needed to support national decarbonisation commitments.

Table 3 Overview of contextual local transport decarbonisation pathways

These pathways <u>are</u>	These pathways are <u>not</u>
<ul style="list-style-type: none"> ✓ Compatible with the pace of decarbonisation needed nationally to achieve national, economy-wide carbon budgets and Net Zero by 2050 (if other sectors in those strategies achieve their own pathways) ✓ Scaled to the size of surface transport emissions for a specific local authority in 2019 as per the Government's greenhouse gas (GHG) inventory ✓ Guiding context – an indicative trajectory of how quickly emissions would need to fall if following the same pace as that national pathway ✓ A pace of decarbonisation shaped by (a) what proportion of carbon budgets transport could take in comparison to other sectors (b) analysis of what impact different interventions might have nationally (c) decisions on what the best-mix of policies and interventions would be nationally 	<ul style="list-style-type: none"> X Targets – there is no legal duty or otherwise for local authorities to achieve these X Reflective of local decarbonisation commitments (e.g. Net Zero in advance of the Government's national 2050 date) X Reflective of place-based characteristics and constraints (e.g. rural areas have less opportunity to shift modes so may decarbonise slower, which in turn would require other areas to decarbonise faster to achieve national commitments) X Based on any local decisions as to the best mix of policies and interventions to decarbonise transport in that place

The following national pathways have been used in this analysis:

- [CCCs The Sixth Carbon Budget Balanced Scenario](#)
- [Net Zero Strategy](#) Surface Transport Indicative Delivery Pathway (upper and lower limits)

The CCC and Net Zero Strategy pathways are only provided at a national level. Both have therefore been 'scaled' to the Government's GHG inventory baseline (2019) estimate of local authority transport emissions. This is done by converting the annual emission values for each to a percentage change from the 2019 baseline of that pathway. These percentage changes are then applied to the baseline 2019 estimate of local transport emissions.

What about Powering Up Britain and the Carbon Budget Delivery Plan?

In 2021, the UK Government published the [Build Back Greener Net Zero Strategy](#) which set out the UK's plans for meeting net zero emissions by 2050 and carbon budgets. The strategy was ruled unlawful by the High Court in July 2021, because it was deemed not to meet the legal obligations under the Climate Change Act, as there was not enough detail in the strategy on how the target would be met.

In response, the Government in 2023 published '[Powering up Britain](#)' which is a more detailed document setting out how the Government will enhance the country's energy security and deliver the UK's net zero commitments. Amongst several documents associated with Powering Up Britain was the [Carbon Budget Delivery Plan](#).

The Carbon Budget Delivery Plan details how the UK Government intends to meet Carbon Budgets 4 to 6 (to 2037) through identified proposals and policies where their potential emission reductions up to 2037 have been quantified. Not all policies, however, could be quantified. The quantified savings (for the economy as a whole) fall short of achieving Carbon Budget 6 but the Government suggests this can be met through a combination of the quantified and unquantified policies that are listed.

The Carbon Budget Delivery Plan provides the latest analysis of how the Government plans to achieve carbon budgets. However, in not being able to quantify all policies and in falling short of achieving carbon budgets, it is not considered to be a suitable national pathway to provide guiding context as to how quickly emissions should fall to achieve national commitments. In contrast, the Net Zero Strategy remains a live policy position of Government with a trajectory of emission reductions which would, it is claimed, achieve carbon budgets and Net Zero by 2050, and so is more appropriate for this purpose.

Since specific detail on how the Net Zero Strategy will be realised has been found by the High Court to be lacking, and the further detail quantified in the Carbon Budget Delivery Plan fails to meet carbon budgets, the CCC's Balanced Pathway arguably represents the most objective analysis of how quickly emissions need to fall to achieve carbon budgets.

Key differences to note between the Net Zero Strategy and CCC Balanced pathway are:

- The CCC Balanced Pathway does not account for the Covid lockdown whereas the Net Zero Strategy includes a 'dip' based on reduced transport emissions in 2020
- The Net Zero Strategy involves a slower rate of decarbonisation up to the mid-2030s – this is assumed to reflect a Government policy decision to rely less on

behaviour change and more on technology. It is assumed other sectors are expected to decarbonise faster to account for this.

- The Net Zero Strategy provides a range – these ranges for residual emissions are provided to reflect inherent uncertainty and give the Government room to respond to real-world changes; it is noted they are not predictions or targets and the ranges do not represent variability in rates of decarbonisation between different places.

Each STB's baseline dashboard provides indicative carbon budgets for the scaled CCC Balanced and Net Zero Strategy pathways. These are taken as the total of residual emissions within each five-year period of active carbon budgets as included in the Climate Change Act. These reported 'carbon budgets' are indicative only but reflect the finite nature of the challenge (i.e. shape of the graph that matters, not just the end-date).

5. WHO TO CONTACT

If you have any questions regarding the scenarios or pathways included within the CAP, please contact your relevant STB decarbonisation lead.