CAMBRIDGESHIRE & PETERBOROUGH COMBINED AUTHORITY

Cambridge & Peterborough CA
Quantified Carbon Reductions Study

Key Findings & Recommendations

February 2023

Commission Summary & Presentation Agenda

WSP Commission: A Summary

A decarbonisation study to establish key insights from this QCR process that will inform LTP development – particularly the nature, scope and scale of measures required in LTP4.

Phase 1 & 2 – Identify the scale of the emissions gap

Phase 3 – Review the potential scale of impact of different policies and interventions

Carbon budgets and pathways → Identify the implementation gap → Identify transport outcomes → Identify interventions

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Linking Outcomes to Interventions

Avoid the worst of Climate Change

International and National Decarbonisation Commitments

- Limiting global temperatures well below 2°C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5°C.
- Meet the UK's Nationally Determined Contribution (NDC) commitment to reduce annual GHG emissions by at least 68% by 2030 compared to 1990.
- Adhere to legally binding, five-year carbon budget aligned to the United Nations Paris Agreement on a pathway to Net Zero by 2050

Scope of this study

Carbon Budgets and Decarbonisation Pathways

- Limit whole-economy emissions to carbon budgets aligned to the Paris Agreement, targeting Net Zero by 2038
- Decarbonise transport on a pathway compatible with carbon budgets and Net Zero commitments.

Identify the Implementation Gap

Identify the preferred mix of transport outcomes needed

Identify interventions to achieve the desired outcomes

Deliver interventions and maximise their carbon outcomes

A golden thread

The diagram opposite illustrates a 'golden thread' that links outcomes to interventions. It is intended to:

- Provide a framework to explain how delivery of interventions links to the substantive outcome of avoiding the worst of climate change
- Help the Combined Authority identify any gaps in evidence, policy or implementation within this framework
- Clarify the scope and structure of this study

DfT Quantifiable Carbon Reduction Guidance

There are four overarching steps to the upcoming QCR guidance. As set out below, the tasks involved in this study will provide insights to both the 'golden thread' and QCR process.

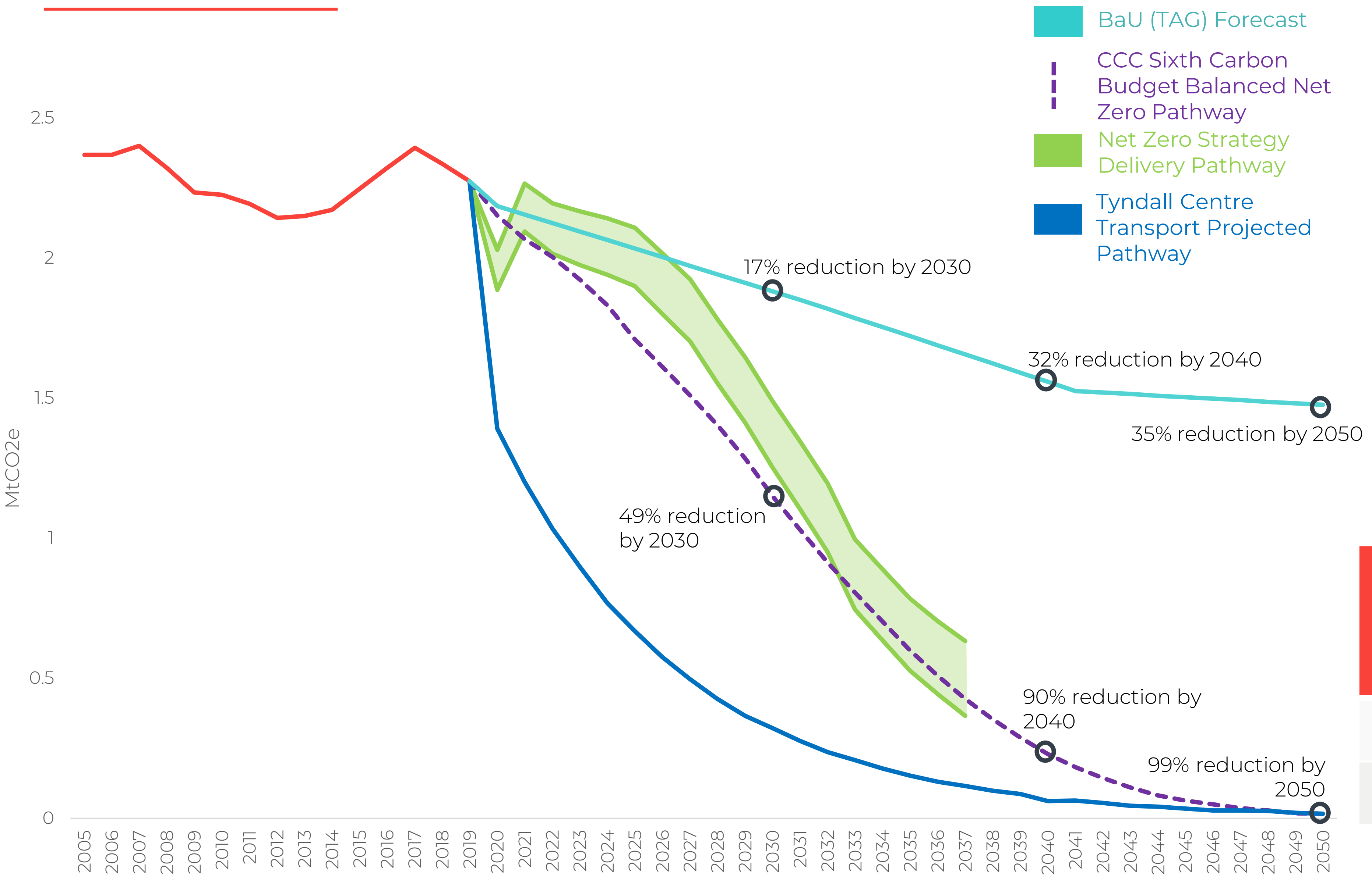
This study	QCR Guidance Key Steps
Task 1. Identify the scale of the emission gap	Step 1. Estimate current and future user emissions
	Step 2. Establish a local transport decarbonisation pathway
Task 2. Review the potential scale of impact of identified LTCP policies and interventions	Step 3. Consider carbon in the generation and appraisal of interventions and policy options for an LTP
Task 3 Review the potential scale of impact of different policies and interventions	Step 4. Estimate the carbon impact of the intervention programme

Required next step

wsp

Carbon budgets and pathways → Identify the implementation gap → Identify transport outcomes → Identify interventions

How Might Transport Emissions in CPCA Change up to 2050 Without Further Intervention?



Emission estimates prepared for this study are derived from strategic traffic model outputs.

Key assumptions for the Business-as-Usual estimate:

- Fleet composition (inc. EV uptake) as per DfT TAG A1.3.9 (November 2022 v1.20.1) (i.e. mileage split of 67% EV by 2050)
- Fuel consumption and emission factors from TAG databook (A1.3.11 & A3.3)
- Traffic growth consistent with forecast years.

Without further intervention, CPCA will exceed each of the next 4 carbon budget periods. The gap between BaU and CCC increases from 2028 onwards.

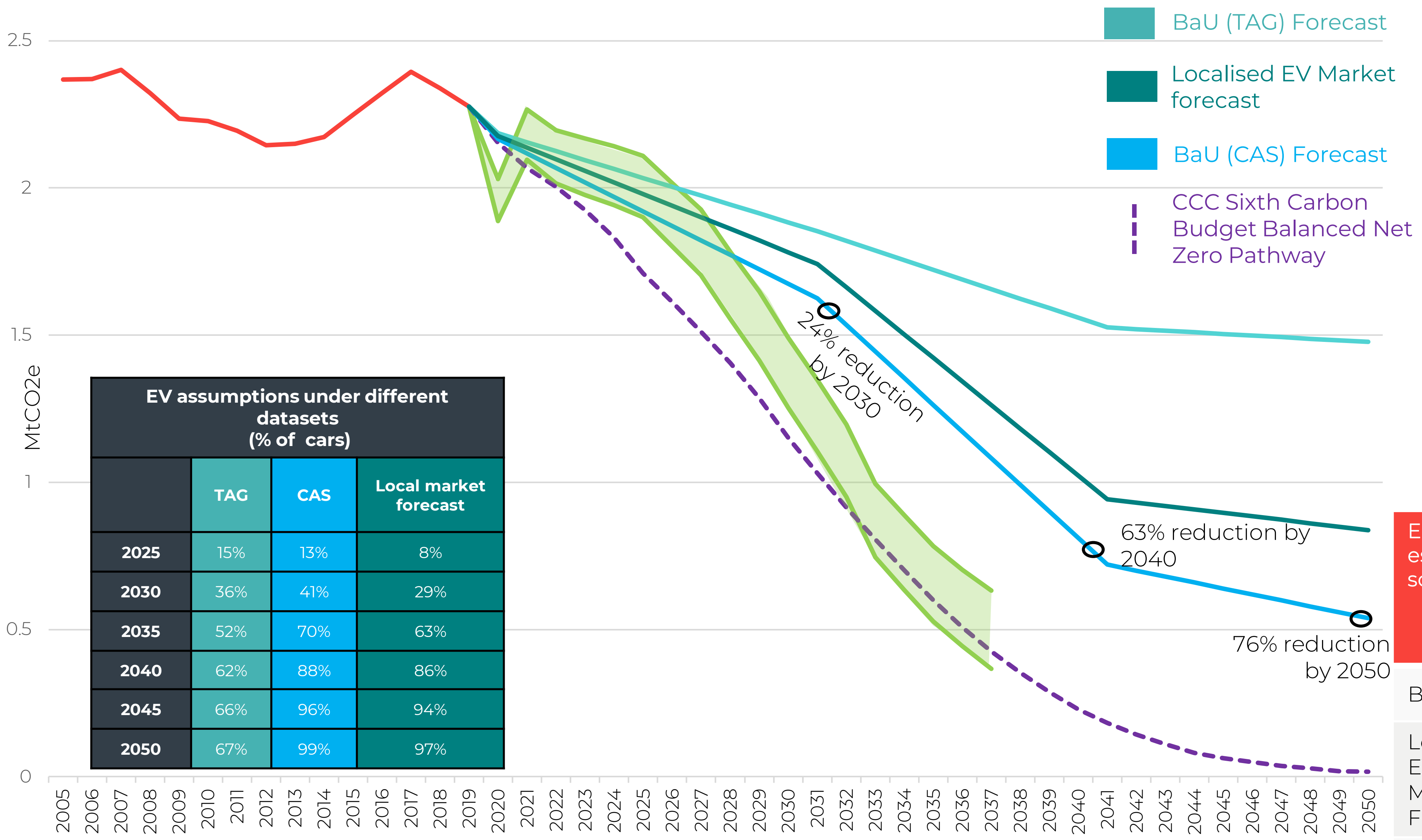
Total emissions estimates within carbon budget periods

Emission estimate scenario	Carbon budget periods (MtCO2e)			
	CB 4 2023-2027	CB 5 2028-2032	CB 6 2033-2037	CB 4-6 2023-2037
BaU	10.17	9.41	8.61	28.19
CCC	8.59	5.79	3.04	17.42

Carbon Budgets and Pathways → Identify the 'implementation gap' → Identify transport outcomes → Identify interventions

Carbon budgets and pathways → **Identify the implementation gap** → Identify transport outcomes → Identify interventions

What Impact Might Accelerated EV Uptake Have?



EV assumptions under different datasets (% of cars)			
	TAG	CAS	Local market forecast
2025	15%	13%	8%
2030	36%	41%	29%
2035	52%	70%	63%
2040	62%	88%	86%
2045	66%	96%	94%
2050	67%	99%	97%

Two alternative scenarios of EV uptake tested:

- DfT Common Analytical Scenario – table VL1 from the vehicle led decarbonisation scenario. This is a scenario only, not a forecast.
- A localised market forecast derived from WSP's EV:Ready tool – processed from a range of forecasts

The TAG and Common Analytical Scenario assumptions are national. The market forecast has been localised to CPCA based on local variations data such as vehicle ownership, sales trends and propensity to switch based on socio-demographics and reliance on on-street parking.

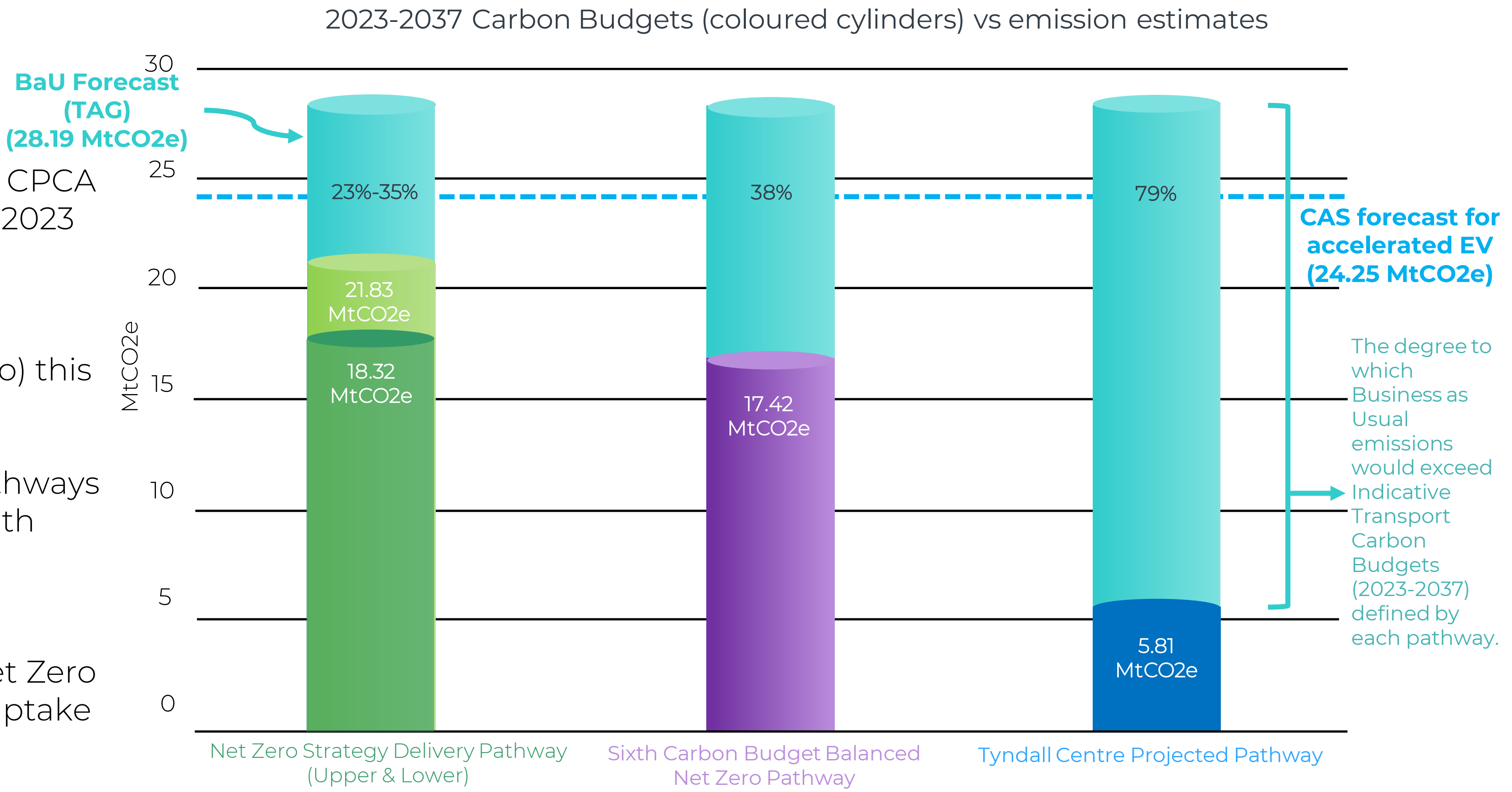
All other assumptions (e.g. traffic growth, fuel efficiency) remain as per the Business-as-Usual estimate.

Emission estimate scenario	Carbon budget periods (MtCO2e)			
	CB 4 2023-2027	CB 5 2028-2032	CB 6 2033-2037	CB 4-6 2023-2037
BaU	10.17	9.41	8.61	28.19
Localised EV Market Forecast	9.90	8.87	7.11	25.88
CAS	9.60	8.33	6.32	24.25
CCC	8.59	5.79	3.04	17.42

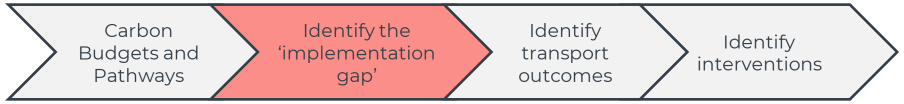
Carbon Budgets and Pathways → **Identify the 'implementation gap'** → Identify transport outcomes → Identify interventions

Size of the Gap

- BaU estimates transport emissions in CPCA will equate to 28.19 MtCO2e between 2023 and 2037
- Under the most ambitious EV uptake scenario (Common Analytical Scenario) this would be reduced to 24.25 MtCO2e
- Carbon budgets derived from the pathways would therefore be exceeded even with ambitious EV uptake
- The smallest exceedance of carbon budgets is to the lower limit of the Net Zero Strategy pathway if CAS levels of EV uptake are achieved (total of 2.42 MtCO2e exceedance between 2023-2037)
- The largest exceedance of carbon budgets is to the Tyndall pathway if only TAG levels of EV uptake are achieved (total of 22.37 MtCO2e 2023-2037)



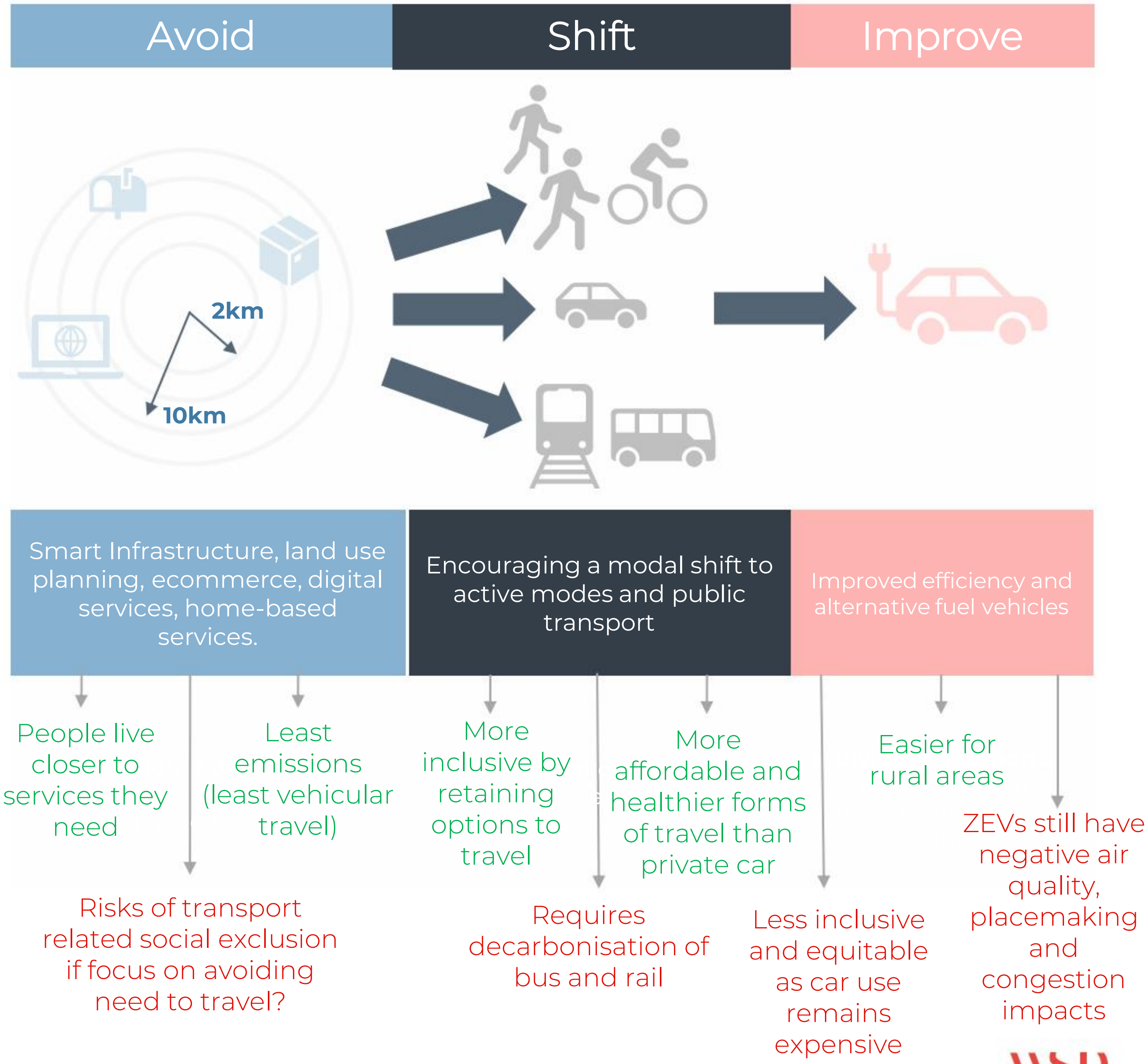
Carbon Budget Periods ($MtCO_2e$)		CB4 2023-2027	CB5 2028-2032	CB6 2033-2037	Total CB4-6 2023-2037
Gap between estimates and budgets (CAS-BaU)	Tyndall Centre	6.20 – 6.76	6.70 – 7.78	5.53 – 7.83	18.43 – 22.37
	CCC Sixth Carbon Budget Balanced Net Zero Pathway	1.01 – 1.58	2.54 – 3.62	3.27 – 5.57	6.83 – 10.77
	Net Zero Strategy Delivery Pathway Lower	0.28 – 0.85	2.05 – 3.13	3.60 – 5.89	5.93 – 9.88
	Net Zero Strategy Delivery Pathway Upper	(-0.76) – (-0.19)	0.86 – 1.95	2.31 – 4.61	2.42 – 6.36



Carbon budgets and pathways → Identify the implementation gap → **Identify transport outcomes** → Identify interventions

Avoid, Shift, Improve

- A framework of outcomes that will decarbonise transport
- The RTPI's Net Zero Transport paper presents an alternative version – "Substitute, Shift and Switch" – presented as a hierarchy that prioritises measures that reduce trips (Avoid and Shift) to focus on solutions that create better places
- Avoid Shift Improve has been widely adopted
- Transport interventions that don't Avoid, Shift or Improve are unlikely to support decarbonisation at the pace required
- Scale of the emission gap demands a 'do-everything' approach… but each outcome has different benefits and impacts as illustrated – the preferred or credible mix may differ by place
- Local authorities are best placed to Avoid and Shift (while enabling ambitious Improve)



Carbon Budgets and Pathways → Identify the 'implementation gap' → **Identify transport outcomes** → Identify interventions

What Scale Of Reduction In Car Use Is Needed?

- Estimates of what scale of demand reduction is needed vary depending on assumptions and method
- However analysis concludes Net Zero and carbon budgets cannot be met without reductions in demand
- Demand reduction needed to close the gap is sensitive to:
    - EV uptake scenarios
    - Improvements in fuel efficiency (manufacturers requirements, driving behaviours etc)
    - Which pathway or Net Zero date is targeted
- Not all of an identified demand reduction may require CPCA intervention. Also influenced by:
    - National policy
    - Background trends (home working etc)

DfT assumptions for growth under their NRTP Core scenario vs Decarbonisation (mode balanced (MB)) scenario (2019-2038):

	DfT Core Scenario			DfT Decarbonisation (MB) Scenario		
	A Road	Minor	Motorway	A Road	Minor	Motorway
Car	13%	13%	22%	8%	8%	8%
LGV	34%	18%	24%	20%	6%	10%
HGV	4%	2%	12%	4%	3%	12%
PSV	-7%	-7%	-7%	-7%	-7%	-7%

What are others finding is needed to achieve decarbonisation commitments?

- CPCA – between **38% and 21% reduction** in car distance travelled relative to baseline growth
- TfN (North of England) – between **3% and 14% reduction** in car distance travelled **relative to baseline growth** (a modest increase in traffic growth from 2019)
- CCC (National) – between **7% and 16% reduction** of total car kilometres by 2030
- Scotland – committed to a **20% reduction** in vehicle use
- Transport for Wales – aim to reduce car miles travelled per person by **10% by 2030**

It is unclear what assumptions for demand reduction BEIS and the DfT have included in Government's Net Zero Strategy and Transport Decarbonisation Plan. Further analysis required to identify what scale of demand reduction may be needed under different EV scenarios and pathways.

CPCA Target (15% reduction) Vs CCC Pathway to 2050

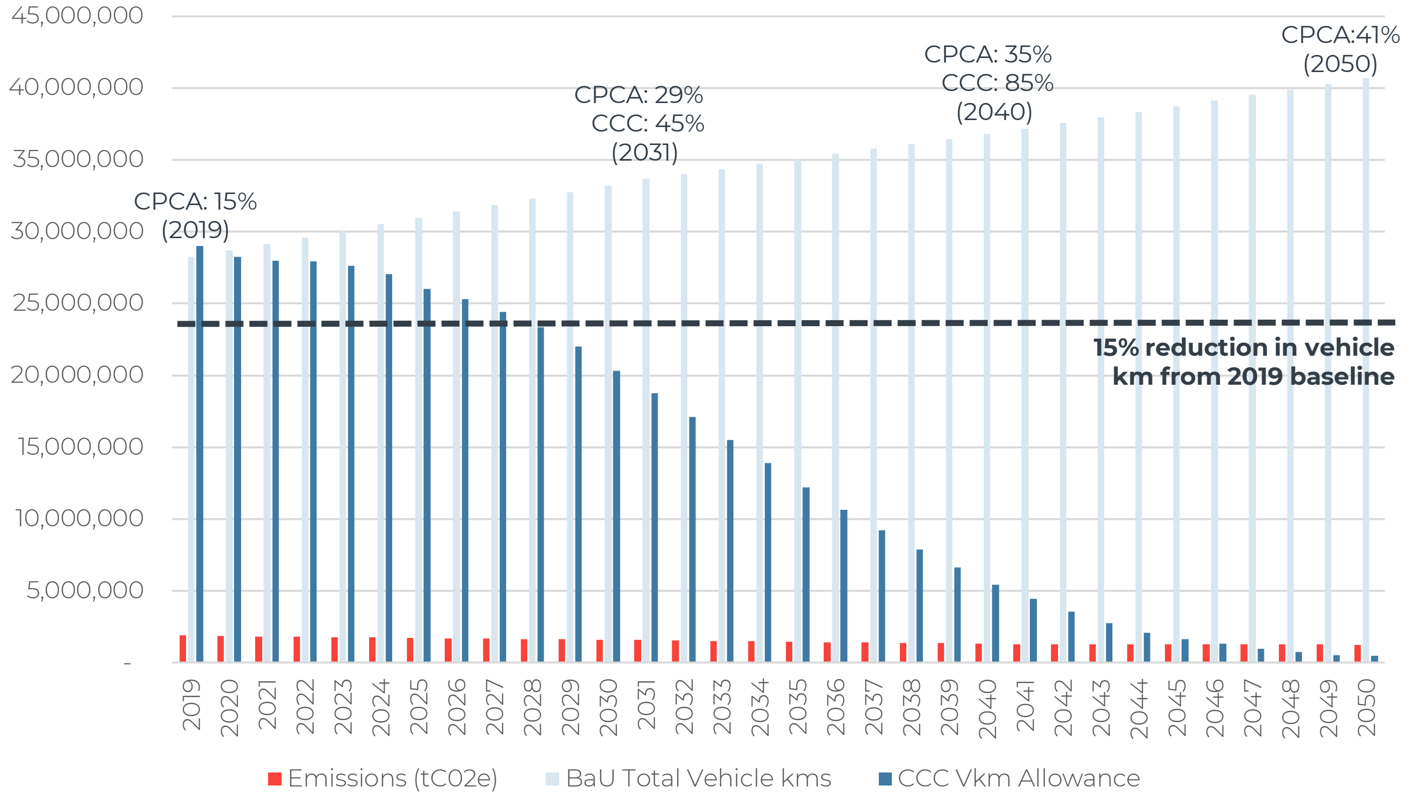
The Cambridge and Peterborough Independent Commission on Climate recommended a **15% reduction in vehicle km in 2030 (from a 2019 baseline).** This was approved by the CA board in June 2021 and is now a commitment.

To achieve this, CPCA will need to target a vkm of:
2019 Baseline vkm = 28,245,089
Target 15% reduction = 4,236,763
Target vkm = 24,008,326 (daily trips)

When taking into account traffic growth (1-2% in vkm year on year), this equates to:
2031 Base = 33,666,166
Growth from 2019 = 5,420,076 (19%)
Required Reduction to achieve CPCA Target = 9,656,840 (29%)Target emissions (tCO2e) = 1,327,395 (tCO2e)

Up until 2028 the graph shows that the CPCA policy target is sufficient to align with the reduction required by the CCC pathway. This shows a suitable level of ambition for the LTP to seek to address.

Beyond 2030, the scale of reduction in vehicle use will need be accelerated beyond the CPCA target to achieve statutory carbon budgets.
- Its important to recognise the difference in removing a tCO2e in 2020 vs in 2050 (13 vkm vs 28 vkm).



Policy contribution to CPCA Decarbonisation:
Baseline Emissions (2031) = 1,852,228 (tCO2e)
CPCA Target Emissions (2031) = 1,327,395 (tCO2e)
CCC Pathway budget (2031) = 1,030,000 (tCO2e)
Further reduction required = 16%

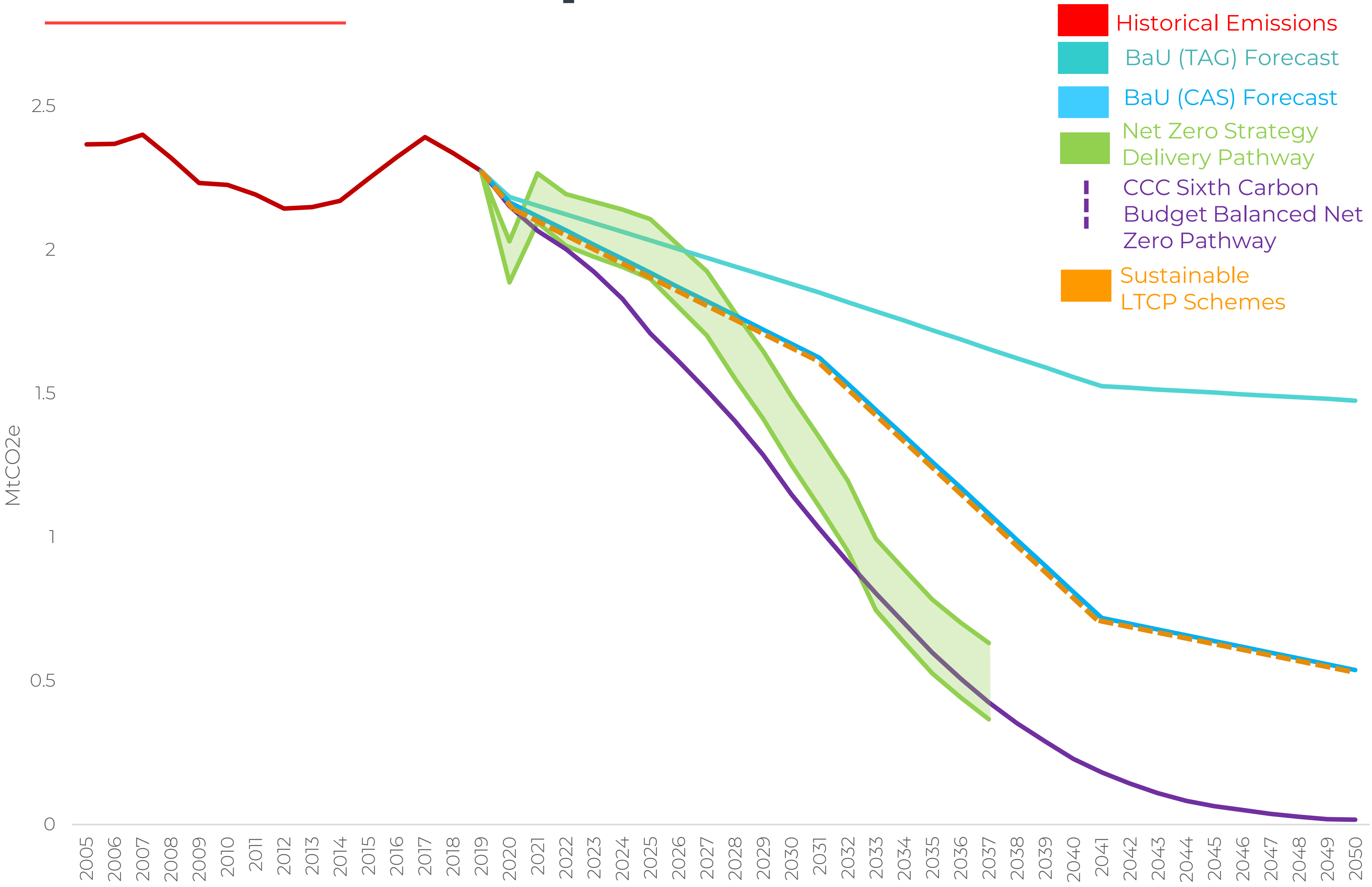
Vkm per tC02e Conversion (TAG)

Year	2019	2020	2025	2030	2035	2040	2045	2050
Daily vkm per tC02e	13	13	15	18	20	24	26	28
Annual vkm per tC02e	4651	4791	5554	6440	7433	8619	9397	10057

Direct conversion variable to vehicle mix, fuel consumption and vehicle speeds*

Carbon Budgets and Pathways → Identify the implementation gap → Identify transport outcomes → **Identify interventions**

Phase 2 Results: Impact of LTCP Sustainable Transport Schemes



Phase 2 of the study assessed the carbon impact of 62 schemes identified within the LTCP Transport infrastructure Plan. In total, 29 / 43 sustainable transport schemes were quantified. The remaining 19 schemes related to highway schemes.

LTCP Sustainable Transport scheme impact:
Public Transport : 0.412 MtCO2e
Active Travel : 0.008 MtCO2e
EV Schemes : 0.041 MtCO2e
Total Impact : 0.451 MtCO2e

This equates to approximately a **0.8% reduction in CPCA cumulative emissions** period 2022 – 2050.

The reduction has been taken from the accelerated EV (CAS) scenario, to represent a best case scenario for carbon reduction.

The impact of the LTCP measures has the potential to be greater than reported. Please refer to outputs of Phase 2.

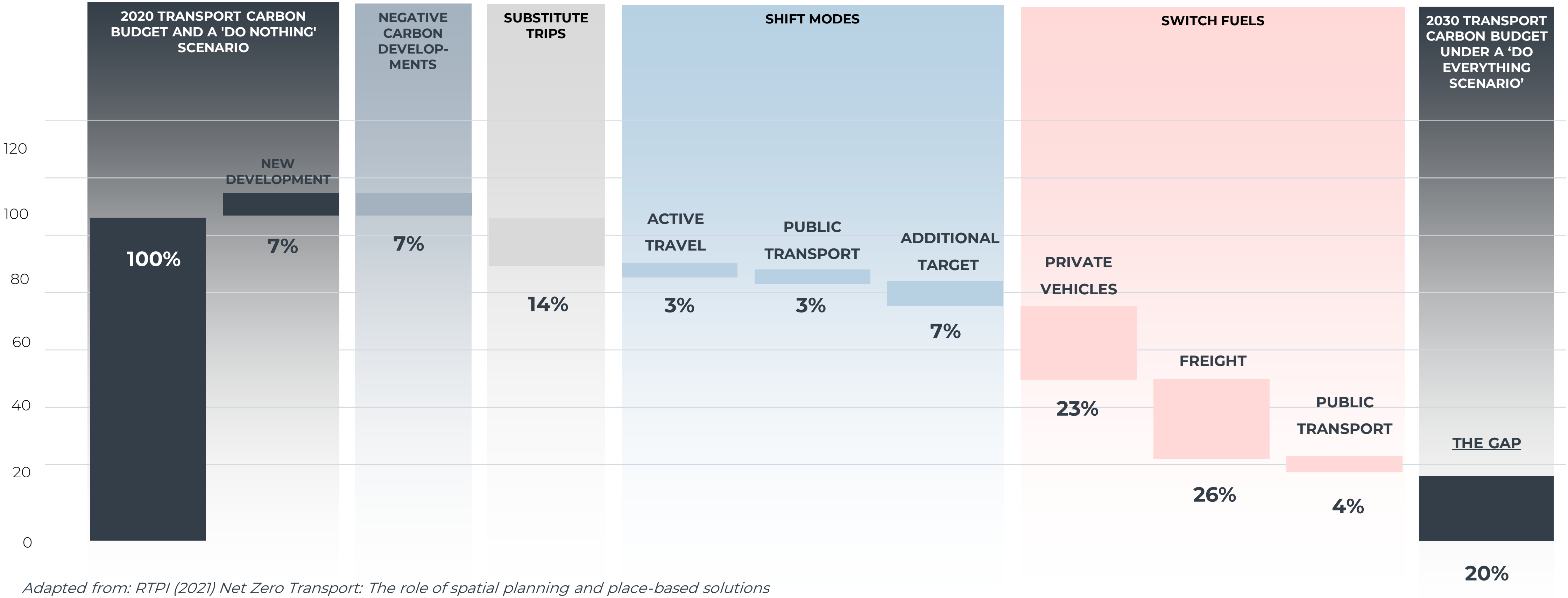
However, this graph only shoes the sustainable transport schemes and does not quantify the impact of highway schemes (valued at 55% of LTCP portfolio).

Are Traditional Measures Enough to Close the Emissions Gap?

"Important to note that there are no future scenarios in which the UK can meet its carbon reduction milestones over the next two decades whilst car traffic is allowed to grow, even if EV uptake accelerates significantly…"

Centre for Research into Energy Demand Solutions

- RTPI waterfall diagram shows that under a "Do Everything Scenario" there could still be a 20% gap to Net Zero in 2030. This research suggests up to a 6% impact can be achieved through mode shift.
- WSP analysis of Leeds LPTIP, WECA CRSTS and other major programmes elsewhere have found similar results, indicating an impact of <5% of total emissions can be achieved through mode shift from traditional measures.
- Infrastructure improvements don't break down enough behavioural barriers for a significant shift.
- Significant improvements in travel choice provided however – a complementary enabler to stronger policy interventions in future



Adapted from: RTPI (2021) Net Zero Transport: The role of spatial planning and place-based solutions

INTERVENTIONS TO CONSIDER BEYOND THE CURRENT LTCP

Intervention Themes

Avoid	Shift	Improve
Reduce the NEED to travel and the DISTANCE people travel	Reduce car-use and encourage a MODAL SHIFT towards public transport and active modes	Improve transport modes through INVESTMENT and TECHNOLOGICAL INNOVATION
Spatial Planning (Self Containment)	Active Travel	Alternative Fuels Uptake
Substitute Trips (Home Working)	Public Transport	Digital Solutions
	Future Freight Solutions	
	Future Mobility & Shared Modes	
	Demand Management (Physical Interventions)	
	Demand Management (Pricing Interventions)	

Themes that have already been assessed

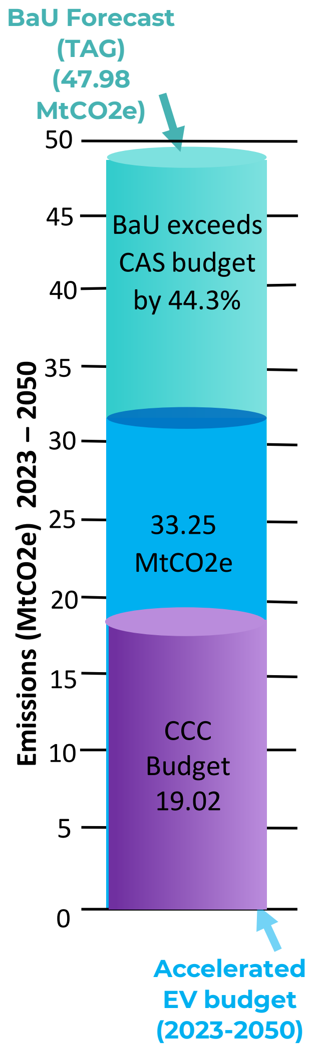
What Scale of Impact Might Different Interventions Have?

Demand Management
Active Travel
Public Transport
Technology / Innovation

MANDATORY
(Carbon budgets not achievable without selection from this list)

Range (up to 2050)	Intervention type	A/S/I	Rank	Scale	Capital	Net Score
>1Mt	Online services / Substitute Trips	Avoid	3	**3**	0	**6**
>1Mt	Area wide Road User Charge	SHIFT	2	**3**	0	**5**
>1Mt	Cordon base Road User Charge	SHIFT	2	**3**	0	**5**
>1Mt	Demand Management (Access and capacity constraints)	SHIFT	2	**3**	-1	**4**
>0.5Mt	Reduced public transport fares	SHIFT	2	**3**	0	**5**
>0.5Mt	Mass Transit	SHIFT	2	**3**	-3	**2**
>0.05Mt	WPL	SHIFT	2	2	0	**4**
>0.05Mt	Parking pricing strategies	SHIFT	2	2	0	**4**
>0.025Mt	Ultra-low emissions buses	IMPROVE	1	2	0	**3**
>0.025Mt	Rail line reopening	SHIFT	2	2	-3	**1**
>0.005Mt	Rail frequency and capacity improvements	SHIFT	2	2	-1	**3**
>0.005Mt	New rail station	SHIFT	2	2	-3	**1**
>0.001Mt	Demand Responsive Transport (DRT)	SHIFT	2	1	0	**3**
>0.001Mt	Bus priority measures	SHIFT	2	1	-2	**1**
<0.001Mt	Mobility hubs & improved modal integration	SHIFT	2	1	-1	**2**
<0.001Mt	Bike/e-bike/e-scooter hire schemes	SHIFT	2	1	-1	**2**
<0.001Mt	Cycle infrastructure	SHIFT	2	1	-2	**1**
<0.001Mt	Improved pedestrian facilities	SHIFT	2	1	-2	**1**

OPTIONALS
(interventions can be tailored to place types to achieve carbon reduction and wider policy co-benefits)



0.5Mt (500,000tCO2e) ~ 1% reduction in CPCA cumulative emissions up to 2050 (BAU Scenario)

The Role of Demand Management

Actively managing the demand for vehicular travel has been found to be the most powerful "lever" for behavioural change.

Includes four main groups:

1. **Network management controls** – for example, modal filters, speed restrictions, road space reallocation, access restrictions and capacity constraints.
2. **Smarter choices & behavioural change campaigns** – for example, personalised travel planning, marketing and promotions, home working, etc.
3. **Pricing measures** – for example, road user charges, low emission zones, parking charges and workplace parking levies, public transport ticketing incentives, etc.
4. **Planning controls** – for example, parking standards, design codes, mixed use and intensification of developments, developer contributions, etc. (Assumed largely outside scope of LTP).

Road user charges (4) has the highest potential to influence car dependency of all interventions, based on the users willingness to pay to drive.

Example: The original **London congestion charge (2003)** reduced vehicle km by 33% within the city centre cordon. Initial results from the larger **London ULEZ zone** has shown a 3-9% reduction in vehicle km and up to 13% reduction in emissions within the cordon.

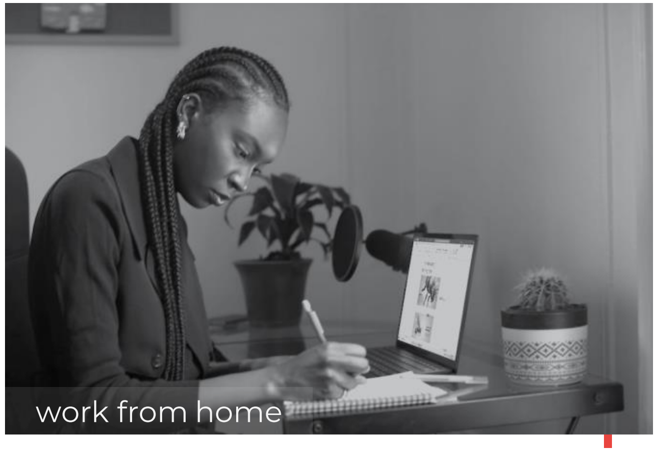

parking charges


speed restrictions


capacity constraints


road user charges

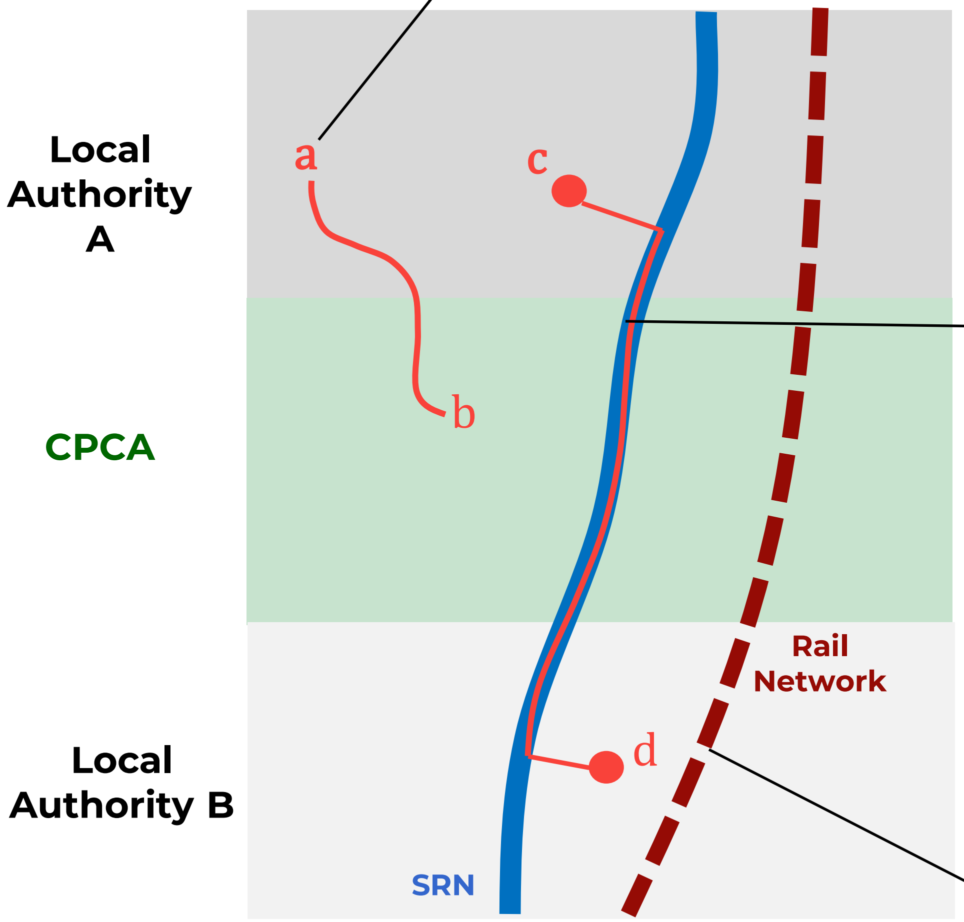
low emission zones


work from home

RATIONALE TO TESTING “INFLUENCING MEASURES”

Influencing Factors	Rationale	Lever in Carbon Tool
Emissions in CPCA Control	Through-trips (trips without a destination within the administrative boundary of the authority) and rail are outside the direct influence of authorities to address through their LTCP.	Remove vehicle km from through trips
Traffic Growth	To account for improvements across spatial planning, we will make assumptions based on the latest evidence from the Committee on Climate change, alongside spatial planning and decarbonisation studies to quantify the extent to which emissions from traffic growth can be avoided.	Reduction in vehicle km traffic growth
Spatial Planning / Self-Containment test	Increasing levels of self-containment can be achieved through optimising the spatial allocation of new developments (20-minute neighbourhoods etc). Evidence is intended to demonstrate the interplay with spatial planning and network-focused interventions, quantifying the impact of fewer vehicle trips over short distances	Reduction in vehicle km for trips <5km
Substitute Trips (impact of online services)	To account for changes in travel behaviour due to home-working and digital service delivery, we will make assumptions and estimate the percentage reduction in vehicle km travelled.	Reduction in commuting trips
Active Travel and Shared Modes	Trip patterns are likely to change following the continued introduction of new transport policies and measures. We intend to provide a high level estimate of how new modes of travel (micro mobility, car clubs, DRT etc) can extend the demand potential of traditional sustainable transport options (walk / cycle / public transport).	Reduction in all trips to urban areas
Alternative Fuels Uptake	Vehicle fleet composition and the uptake of electric vehicles can have a significant bearing on carbon emissions trajectories. The baseline model used in this assessment uses TAG assumptions of electric vehicle uptake which are based on current forecasts but do not include the 2030 ban on the sale of new petrol and diesel (ICE) vehicles.	Reduction in emissions per vehicle km by using updated EV forecast
Impact of BSIP	The Bus Service Improvement Plan (BSIP) has the potential to supplement measures identified in the LTCP to expediate the switch to public transport. Phase 3 will quantify the potential scale of impact of these changes.	Reduction in vehicle km travelled in response to growth in PT patronage
Future Mobility Solutions to Freight	42% of vehicle emissions in CPCA relate to trips made by HGVs and LGVs. As trip patterns continue to change, future mobility solutions such as first and last mile measures, consolidation centres and network management measures will be required to decarbonise servicing and freight trips on the network.	Reduction in LGV / HGV emissions
Demand Management (Physical Constraints)	Physical constraints are now being deployed to restrict vehicle use in targeted locations to reach policy objectives. The study will provide a high-level indication of the potential impact of these demand management measures (capacity and access constraints) in urban centres.	Multiple levers, variable impact
Demand Management (Pricing Measures)	Beyond the scope of traditional measures, pricing measures are expected to have the greatest influence on travel behaviour and therefore carbon emissions. Based on their scale of potential influence, the 4 measures identified below will be assessed: - Cordon-Based Road User Charge (RUC) - Area Wide Charge (RUC) - pay per km - Workplace Parking Levy (WPL) - Car Park Pricing Strategies	Multiple levers, variable impact

Emissions in the Combined Authority’s and District’s Influence



trip a > b
Trip with origin or destination in CPCA– arguably in direct influence of the Combined Authority or districts

trip c > d
Through trip without origin or destination in CPCA – arguably NOT in direct influence of the Combined Authority or districts?

Rail trip
Emissions from operational rail use – arguably NOT in direct influence of the Combined Authority or districts?

MODEL RESULTS

Through trips, which are largely outside the direct influence of the CA are apportionable to:

2031 vkm = 35%

2031 emissions = 41%

Supporting evidence on emissions profile from 2019:

- Trip Length (miles): 25 to 50 = 17% | 50+ = 37%
- Road type: 45% Local | 10% MRN | 45% SRN

Significance to Phase 3 Modelling

- Of all measures modelled within this study, only road user charges will impact vehicle through trips.
- This means the intensity of measures has to be disproportionately increased to offset the emissions outside of the direct influence of the CPCA.

Significance to LTP QCR Guidance

- QCR guidance expected to require LTAs to report total emissions in order to provide a holistic view
- DfT unlikely to offer an explicit view of the scope of emissions within different authority’s influence or responsibility
- Excluding emissions such as through-trips can present a more targeted picture of the ‘gap’ to target and support engagement with other authorities.

Carbon Budgets and Pathways > Identify the ‘implementation gap’ > Identify transport outcomes > Identify interventions

IMPACT OF LIMITING TRAFFIC GROWTH

Rationale: The TDCM includes growth factors to account for housing projections and traffic growth. This assumes that new growth broadly replicates current travel patterns and that all new developments induce travel demand. The Government has made the significant step of acknowledging the need to limit traffic growth, but have not as yet set a specific ambition or target. The TDP and CCC Report to Parliament have raised concerns that not all available levers are currently being used. To quantify the potential scale of emissions reductions which are achievable by limiting traffic growth, we have applied sensitivity tests to the growth factors used in the traffic model.

Method:
1. Identify annual growth in vehicle km travelled (~ 1% to 2% per year)
2. Apply manual reductions to the growth

Assumption:
CPCA requires a Spatial Development Strategy (SDS) to apply a carbon lens to the Local Plan alongside the LTP measures to enable this reduction

Step 1: Identify annual growth factors

Baseline	2025	2030	2035	2040	2045	2050
Total Vehicle km (vkm)	30,955,128	33,213,493	34,686,651	36,415,108	38,309,678	40,245,776
Total Emissions (tCO2e)	2,034,337	1,882,579	1,721,827	1,558,827	1,504,140	1,476,531
Year on year Vkm growth	1.015	1.014	1.010	1.010	1.010	1.010

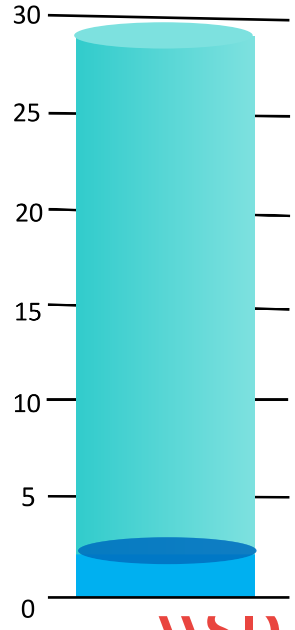
Step 2: Apply manual reductions to the growth factors

Reduction Factor		2031	% Emission Reduction
10% reduction in annual growth	Vkms	45,167	**0.57%**
	Emissions	10,466	
25% reduction in annual growth	Vkms	112,918	**0.76%**
	Emissions	14,154	
50% reduction in annual growth	Vkms	225,837	**1.16%**
	Emissions	21,528	

*Baseline Total 2031 Vkm : 33,303,888 | 1,852,228 tCO2e

Considerations for LTP:
New developments offer significant opportunity to embed carbon neutral travel patterns, avoiding further car dependency. Once developed, its increasingly difficult (and costly) to retro-fit sustainable travel choices.
- Action requires greater co-ordination between transport planning and highways development management.

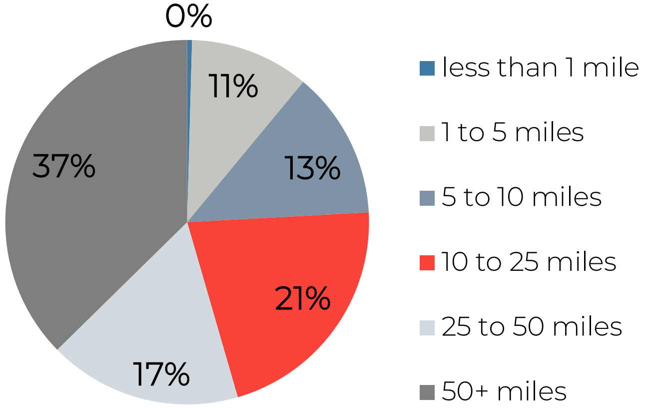
Contribution to 15% Reduction Policy



SELF CONTAINMENT TEST (SPATIAL PLANNING)

Rationale: Design codes for new developments advocate the 20-minute neighbourhood as best practise – allowing trips within a 20 minute journey time to be made by walk / cycle. Successful neighbourhoods would encourage localisation by brining more services and activities closer to residents – including local shopping and health facilities, education, green spaces, housing, safe streets, public transport and employment.

Emissions by journey Distance



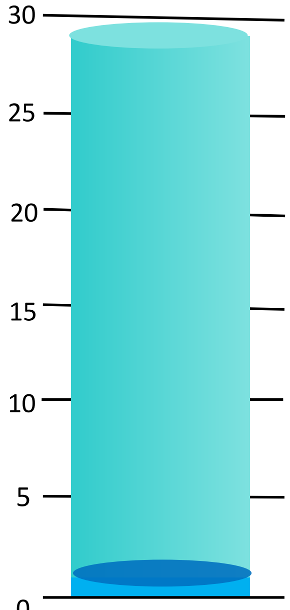
Method:
1. Identify responsive demand (car trips < 5 miles in distance)
2. Apply trip reduction factor by trip purpose for internal, in-bound and out-bound trips

Assumption:
Only applied to Cambridge and Peterborough
Reduction in car trips/vehicle kms by purpose: Business: 10% | Commute: 10% | Other (personal business, leisure, shopping): 14%
LGV / HGV movements non responsive

Results:

Impact in 2031	CPCA
Responsive Trips (Total trips within distance band)	2,676,755 (8%)
Total Responsive Trips after reduction (vkm and %)	2,385,079 (-10.9%)
Reduction in CPCA trips (vkm and %)	291,676 (-0.87%)
Reduction in CPCA trips emissions (tC02e and %)	12,161 (-0.65%)

Contribution to 15% Reduction Policy



Supporting evidence on emissions profile from 2019:
- Trip Length (miles): 25 to 50 = 17% | 50+ = 37%
- Road type: 45% Local | 10% MRN | 45% SRN

Considerations for LTP:
Requires integration of land use planning and LTP
Requires place-based approach to infrastructure delivery
Requires behavioural change

*Baseline Total 2031 Vkm : 33,303,888 | 1,852,228 tCO2e

IMPACT OF ONLINE SERVICES

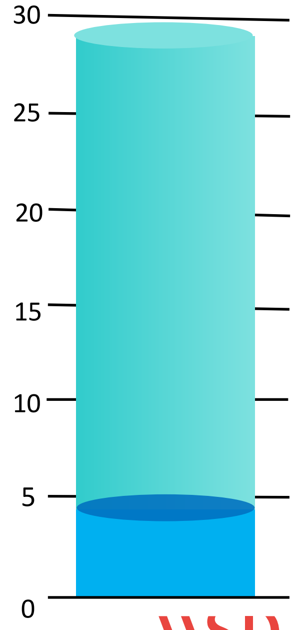
Rationale: Increased provision of online services and opportunities provides the potential to reduce emissions by reducing travel as people work, attend meetings or appointments or shop virtually at home or at a local digital hubs, rather than making a journey. This would build on the step-change in virtual activity seen during the COVID-19 pandemic. Increased activity relies on strong digital connectivity based on strong and reliable 5G and broadband connections in homes, businesses and local digital hubs (to provide alternatives to connecting at home) and on public and private sector bodies increasing the range of online services they provide.

Method:
1. Identify responsive demand (HGV Trips excluded)
2. Apply trip reduction factor by trip purpose

Assumption:
Reduction in car trips/vehicle kms by purpose: Business: 10% | Commute: 10% | Other (personal business, leisure, shopping): 10%
Business LGV = Increased by 5%
HGV movements non responsive

Results (in 2031)	CPCA
Responsive Trips (Total trips within each purpose)	31,372,918 (93%)
Reduction in responsive trips (vkm and %)	29,012,039 (-7.53%)
Reduction in CPCA trips (vkm and %)	2,360,879 (-7.01%)
Reduction in CPCA trips emissions (tC02e and %)	86,595 (-4.63%)

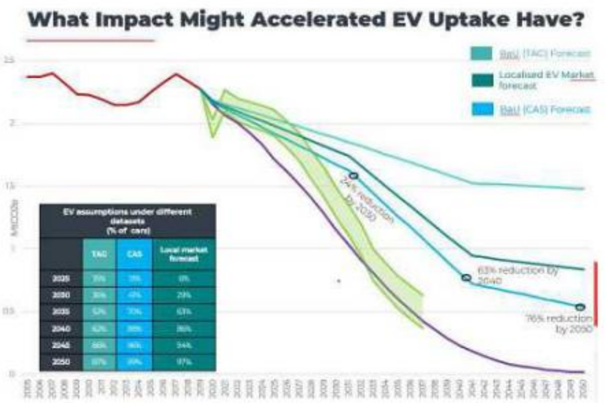
Contribution to 15% Reduction Policy



Considerations for LTP:
Raises importance of improved digital connectivity
Importance of freight solutions to offset LGV trips (particularly for first and last mile).
Measures will also need to be carefully designed and implemented with other measures to prevent 'rebound travel' where people make other journeys with the time made available and increases in van deliveries

*Baseline Total 2031 Vkm : 33,303,888 | 1,852,228 tCO2e

ALTERNATIVE FUELS UPTAKE



Refer back to slide 7 for more information on EV impact

EV Uptake Scenarios tested:

1. **Business-as-Usual (TAG) Scenario** – based on latest version of TAG Databook A.1.3.9.
- Minimum requirement of QCR guidance
1. **DfT Common Analytical Scenario** – table VL1 from the vehicle led decarbonisation scenario.
-Minimum requirement of QCR guidance
1. **Localised market forecast** - derived from WSP's EV: Ready tool and processed from a range of forecasts.
- Considered Optional by QCR guidance.

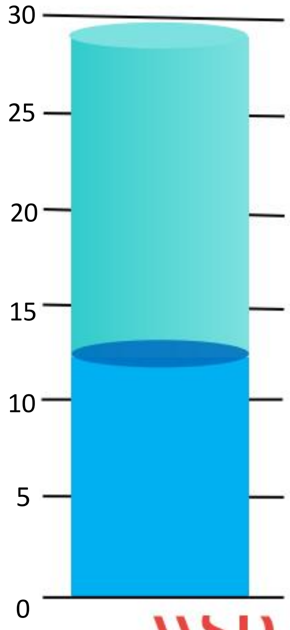
Method

To assess a best case scenario of EV uptake, the Common Analytical Scenario will be taken from the Business-as-Usual emissions in 2031.

This will highlight the residual emissions which avoid and shift measures must seek to address through the LTP4.

Scenario	2031 Emissions
BAU TAG (MtCO2e)	1.85
CAS (MtCO2e)	1.62
Reduction	**12%**

Contribution to 15% Reduction Policy



Considerations for LTP Development

TAG A1.3.9 should be considered the lower limit as it represents firm and funded policies, and recognised growth forecasts (NTM / RTF). However, this will not account for national bans on new Internal Combustion Engine Vehicles (ICEVs) in 2030.

The 'accelerated ZEV uptake' Common Analytical Scenario should be considered the upper limit or best case scenario of potential ZEV uptake nationally.

Local Authorities Role

Authorities have a critical role to play in planning and delivering the charging infrastructure that will enable ambitious uptake of ZEVs; particularly where the market may fail to do so. While national policy will likely drive higher uptake than currently modelled in TAG data, the ambitious levels of ZEV uptake included in the CAS are unlikely to be achieved without ambitious delivery of local charging infrastructure. Authorities must therefore have a local EV infrastructure strategy to ensure sufficient charging infrastructure will be delivered in their area. Further guidance is provided in the 'Local Transport Plan Guidance 2023' and UK electric vehicle infrastructure strategy.

*Baseline Total 2031 Vkm : 33,303,888 | 1,852,228 tCO2e

POTENTIAL CARBON IMPACT OF ACHIEVING BSIP TARGETS

Rationale:
The Bus Service Improvement Plan (BSIP) has the potential to supplement measures identified in the LTCP to expediate the switch to public transport. Phase 3 will quantify the potential scale of impact of these changes. Our analysis will estimate the scale of reduction in car use you could expect if BSIP reaches its target for bus patronage. We will also test the impact of discounting fare prices across CPCA.

Inputs:
2019 Baseline Passenger Trips: 29.3 million
2024 / 25 BSIP Target Passengers: 33.7 million (15% uplift)
NTS Survey (NTS0601, NTS0605)
TAG Databook (Table A.5.4.6)

Method:
1. Identify increase in bus patronage
2. Quantify mode shift from car to bus (increase in bus passenger trips * TAG diversion factor)
3. Vehicle trips * average trip distance to calculate total vkm saved
4. Convert vkm to tC02e

Assumption:
Another BSIP is delivered between 2025 – 2030.
Growth in passenger trips is from a 2019 baseline.

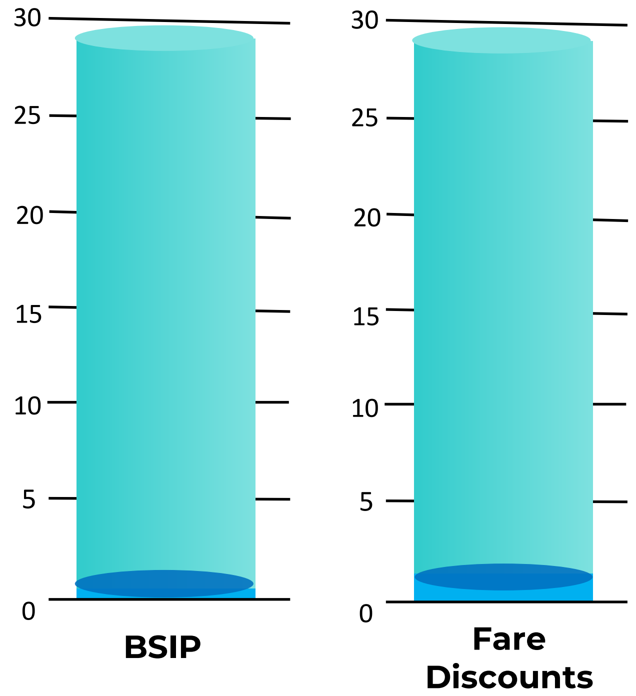
Passenger Growth Sensitivity Test Results:

Intervention	Annual Bus Passenger Trips	Car Trips Removed (daily)	Vkm Removed (daily)	Annual Emissions (tCO2e)	% reduction in CPCA Emissions
BSIP Target (15%)	33.7m	3,000	37,004	2,004	0.11%
30% Growth	38.1m	5,993	73,925	4,003	0.21%
50% Growth	43.9m	9,989	123,208	6,672	0.36%
100% Growth	58.6m	19,977	246,415	13,344	0.71%

Fare Discount Results

Intervention	Annual Emissions (tCO2e)	% reduction in CPCA Emissions
50% reduction	14,313	0.77%
100% reduction	28,644	1.53%

Contribution to 15% Reduction Policy



Considerations for LTP:
Scale of impact reflects limitations of funding mechanisms for public transport improvement
Optimising the provision of services (routing, capacity and frequency) could return a greater level of carbon reduction than that purported.

*Baseline Total 2031 Vkm : 33,303,888 | 1,852,228 tCO2e

FUTURE MOBILITY SOLUTIONS TO FREIGHT

Rationale: LGV / HGV movements make up 42% of emissions in CPCA. For short distance trips of less than 5 miles, they constitute 1% of vehicle km, but 3% of total emissions. Particularly with the rise of home deliveries, there is a need to provide first and last mile solutions to freight deliveries. This sensitivity test quantifies the potential scale of carbon reduction which can be achieved by reducing the vkm assigned to LGV / HGV movements within the urban areas of Cambridge and Peterborough.

Method:

1. Identify responsive demand
2. Apply trip reduction factor for internal, in-bound and out-bound trips

Assumption:

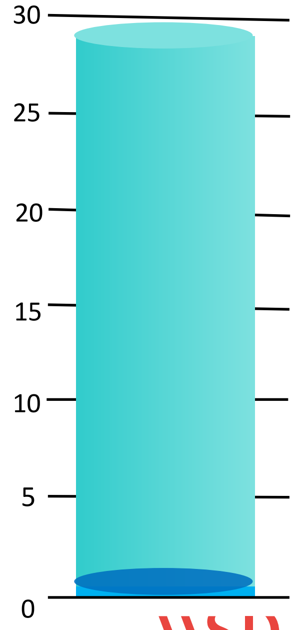
Only applied to Cambridge and Peterborough
Car trips are excluded
Assumes freight deliveries are shifted to zero emission vehicles

Results (in 2031)	CPCA	Cambridge	Peterborough
Responsive Trips (Total trips affected)	326,333 (1%)	125,847 (9.4%)	200,486 (2.8%)
Reduction in daily responsive trips (vkm and %)	261,067 (-20%)	100,678 (-20%)	160,389 (-20%)
Reduction in daily trips (vkm and %)	65,267 (-0.19%)	25,169 (-1.9%)	40,097 (-0.56%)
Reduction in annual emissions (tC02e and %)	5,357 (-0.29%)	1,628 (-2.50%)	**3,729 (-1.01%)**

Considerations for LTP:

Measures to improve efficiency of supply chain required across all scales
Requires public / private partnership and co-ordination.
Shift to electric vehicles (vans, cargo bikes etc) essential.
Consolidation centres and consolidation of operations essential.

Contribution to 15% Reduction Policy



*Baseline Total 2031 Vkm : 33,303,888 | 1,852,228 tCO2e

CITY CENTRE CAPACITY CONSTRAINTS

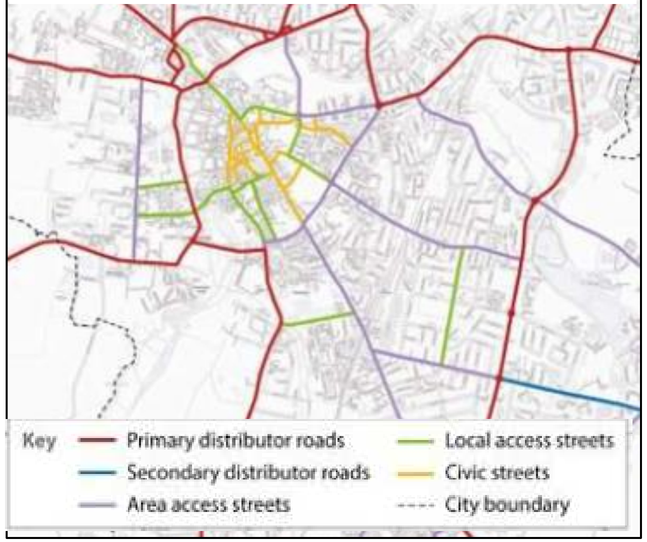
Rationale: Vehicle capacity constraints are physical constraints deployed to restrict vehicle use in targeted locations to reduce vehicle numbers and emissions. For this study these will be for a cordon based reduction, based on the city centre. The study will provide a high-level indication of the potential impact of these demand management measures (capacity and access constraints) in urban centres.

Method:
1. Identify city centre cordon and traffic data (shown below)
2. Identify responsive trips – traffic within cordon (exclude through trips)
3. Apply reduction factor to all responsive trips

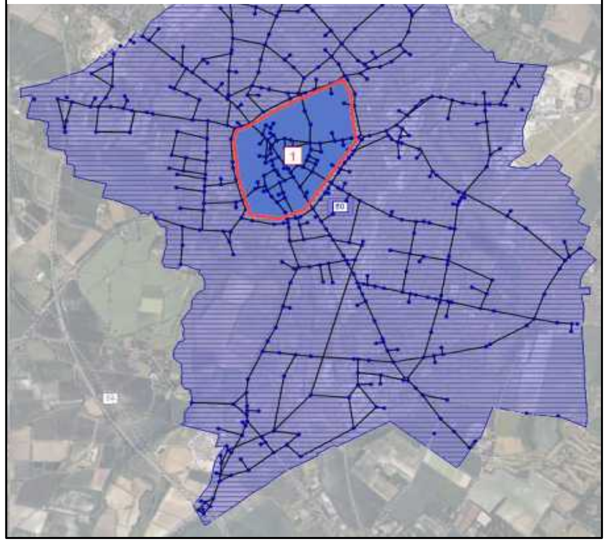
Assumption:
Affects all trip purposes
Through trips excluded
Applies separate reduction factors to both responsive trips and non responsive trips (to account for traffic displacement)

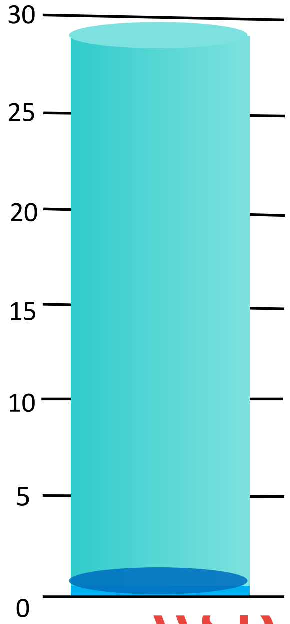
Results (in 2031)	Capacity Restraint
Responsive Trips (Total trips captured by cordon)	2,823,816 (8.39%)
Reduction in responsive trips (vkm and %)	2,654,387 (-6%)
Reduction in CPCA trips (vkm and %)	169,429 (-0.5%)
Reduction in CPCA trips emissions (tC02e and %)	**8,521 (-0.5%)**

"A new Road Classification for Cambridge"
Making Connections



Phase 3:
Cambridge City Centre Cordon





Considerations for LTP
- To achieve a new road classification system for Cambridge and Peterborough, significant changes to the network are required to rebalance the priority between different road users.
- Removing capacity for vehicles can be achieved through
- Roadspace reallocation
- Mo

CORDON BASED ROAD USER CHARGE

DESCRIPTION : Cordon based road user charge schemes involve charging drivers a fee for driving within a specified charging zone. Fees can vary by vehicle type (including emissions category), time period (peak period only etc) and can include a number of exemptions. For this study, a flat fee has been assigned to any vehicle driving in the designated cordons within Cambridge and Peterborough. Sensitivity tests have then been applied to estimate the impact of a variable charge (peak period travel only) and a congestion charge (HGV only)

METHOD OVERVIEW

1. Identify Monetary cost of travel/hr in forecast year (MCT): Value of time (VOT) + Vehicle operating Cost (VOC) * Speed
2. Calculate total cost of travel/hr in forecast (TCT) by adding the Monetary cost of travel/hr with Cordon Based Charge (Pence/hr).
3. Identify responsive vehicle km (trips entering cordon)
4. Select the Elasticity values based on Traffic type and Short term/Long term effect.
5. Calculate reduction in VKT.
6. Run VKT through Carbon Tool

INPUTS

Congestion Charge (Pence/hr) - Input required.
VKM taken from Road Genesis
Short term/Long term elasticity figures
VOT (Pence/min) - GCV Webtag May 2022
VOC (Pence/km) - GCV Webtag May 2022
Speed (Km/hr) and distance bands.

ASSUMPTIONS

A flat fee is charged for any vehicle which travels within the cordon .£8 is considered a suitable starting intensity
Charge fee will need to increase in line with value of time increases to maintain effectiveness

EVIDENCE SOURCES

TAG Data Book (VOT/VOC/GDP Deflator)
Elasticities from Literature - using London as a benchmark.

SCHEME IMPACT

Scale	Cambridge	Y
	Peterborough	Y
	All CPCA	N
Time Period	All Periods	Y
	AM / PM Peak Only	Y
Vehicle Type	Car	Y
	LGV	Y
	HGV	Y
Genesis	Internal	Y
	Inbound / Outbound	Y
	Through Trips	Y
Journey Distance	All Distances	Y
	0-5 miles only	N
Journey Purpose	All Purposes	Y
	Commute / Business only	N

RESULTS

Headline Findings:

- ~10% of total vkm captured by Cambridge and Peterborough cordons
- Cordons reduce vkm by > 25% within the respective cities
- Total impact lower than found elsewhere due to high % non responsive

CPCA Results (in 2031)	£8 per day	£10 per day	£15 per day	£30 per day
Responsive Trips (Total trips captured by cordon)	3,429,436 (10.2%)	3,429,436 (10.2%)	3,429,436 (10.2%)	3,429,436 (10.2%)
Reduction in responsive trips (vkm and %)	2,568,239 (-25.1%)	2,352,940 (-31.4%)	1,814,692 (-47.1%)	522,477 (-84.8%)
Reduction in CPCA trips (vkm and %)	861,197 (-2.56%)	1,076,496 (-3.2%)	1,614,744 (-4.8%)	2,906,959 (-8.63%)
Reduction in CPCA trips emissions (tC02e and %)	37,157 (2%)	46,446 (2.5%)	69,669 (3.7%)	127,154 (6.8%)

CORDON BASED ROAD USER CHARGE (VARIABLE CHARGE)

DESCRIPTION : Cordon based road user charge schemes involve charging drivers a fee for driving within a specified charging zone. Fees can vary by vehicle type (including emissions category), time period (peak period only etc) and can include a number of exemptions. For this study, a flat fee has been assigned to any vehicle driving in the designated cordons within Cambridge and Peterborough. Sensitivity tests have then been applied to estimate the impact of a variable charge (peak period travel only) and a congestion charge (HGV only)

METHOD OVERVIEW

1. Identify Monetary cost of travel/hr in forecast year (MCT): Value of time (VOT) + Vehicle operating Cost (VOC) * Speed
2. Calculate total cost of travel/hr in forecast (TCT) by adding the Monetary cost of travel/hr with Cordon Based Charge (Pence/hr).
3. Identify responsive vehicle km (trips entering cordon)
4. Select the Elasticity values based on Traffic type and Short term/Long term effect.
5. Calculate reduction in VKT.
6. Run VKT through Carbon Tool

INPUTS

Congestion Charge (Pence/hr) - Input required.
VKM taken from Road Genesis
Short term/Long term elasticity figures
VOT (Pence/min) - GCV Webtag May 2022
VOC (Pence/km) - GCV Webtag May 2022
Speed (Km/hr) and distance bands.

ASSUMPTIONS

Charge only applies to AM and PM peak travel
Modelling does not take into account peak spreading
£8 is considered a suitable starting intensity
Charge fee will need to increase in line with value of time increases to maintain effectiveness

EVIDENCE SOURCES

TAG Data Book (VOT/VOC/GDP Deflator)
Elasticities from Literature - using London as a benchmark.

SCHEME IMPACT

Scale	Cambridge	Y
	Peterborough	Y
	All CPCA	N
Time Period	All Periods	N
	AM / PM Peak Only	Y
Vehicle Type	Car	Y
	LGV	Y
	HGV	Y
Genesis	Internal	Y
	Inbound / Outbound	Y
	Through Trips	Y
Journey Distance	All Distances	Y
	0-5 miles only	N
Journey Purpose	All Purposes	Y
	Commute / Business only	N

RESULTS

Results (in 2031)	8 pounds per day	15 pounds per day	30 pounds per day
Responsive Trips (Total trips captured by cordon)	1,408,856 (4.18%)	1,408,856 (4.18%)	1,408,856 (4.18%)
Reduction in responsive trips (vkm and %)	1,047,575 (26%)	731,454 (-48%)	183,459 (-87%)
Reduction in CPCA trips (vkm and %)	361,281 (-1.07%)	677,401 (-2.01%)	1,225,397 (-3.64%)
Reduction in CPCA trips emissions (tC02e and %)	15,228 (-0.82%)	28,553 (-1.53%)	52,117 (-2.79%)

AREA WIDE ROAD USER CHARGE

DESCRIPTION : Area wide road user charge schemes involve charging drivers a fee for driving within a specified charging zone. Similar to cordon base charges, fees can be variable. For this study, three tests have been undertaken: 1) a flat fee per km travelled for every vehicle, 2) a variable fee, where per km travelled outside of the urban cordons (Cambridge and Peterborough) there is a 50% higher fee compared to vehicle km within these cordons, and 3) an electric vehicle subsidy, where 50% discount is applied for trips undertaken in an electric vehicle to account for the difference in user emissions per trip.

METHOD OVERVIEW

1. Identify Monetary cost of travel/hr in forecast year (MCT) using TAG data. Value of Time (VOT) + Vehicle operating cost (VOC) * Speed.
2. Calculate the total cost of travel/hr in forecast (TCT): Monetary cost of travel/hr (MCT) + cordon based-charge.
3. Estimate % increase in avg. Travel Cost
4. Estimate % Reduction in vehicle km travelled
5. Calculate reduction in vehicle km travelled for each link.

INPUTS

Congestion Charge (Pence/hr) - Input required
Fixed Charge (Pence/hr)
Variable Charge (Pence/hr)
Electric Vehicle Subsidy (Pence/hr)
VOT (Pence/min) - GCV Webtag May 2022
VOC (Pence/km) - GCV Webtag May 2022
Speed (Km/hr) and distance bands.

ASSUMPTIONS

The charge applies at all time periods, for all journey purposes and on all road types (except SRN).
Charge will need to increase in line with changes in value of time to maintain effectiveness

EVIDENCE SOURCES

TAG Data Book (VOT/VOC/GDP Deflator)
Elasticities from TAG Unit M2.1

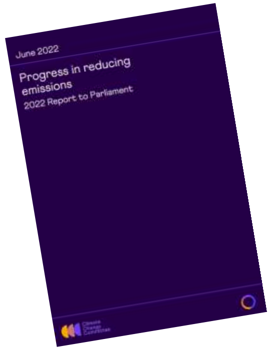
SCHEME IMPACT

Scale	Cambridge	Y
	Peterborough	Y
	All CPCA	Y
Time Period	All Periods	Y
	AM / PM Peak Only	Y
Vehicle Type	Car	Y
	LGV	Y
	HGV	Y
Genesis	Internal	Y
	Inbound / Outbound	Y
	Through Trips	Y
Journey Distance	All Distances	Y
	0-5 miles only	N
Journey Purpose	All Purposes	Y
	Commute / Business only	Y

RESULTS

	Responsive Trips	Reduction in responsive trips (vkm and %)	Reduction in CPCA trips (vkm and %)	Reduction in CPCA trips emissions (tC02e and %)
Pay per Mile Current Approach (10 pence)	33,665,166 (100%)	31,286,706 (-7%)	2,378,460 (-7.07%)	95,812 (-5.1%)
Pay per Mile Current Approach (20 pence)	33,665,166 (100%)	28,908,246 (-14%)	4,756,921 (-14.13%)	191,625 (-10.3%)
Pay per Mile Current Approach (25 pence)	33,665,166 (100%)	27,719,015 (-18%)	5,946,151 (-17.66%)	239,531 (-12.8%)
Pay per Mile Current Approach (50 pence)	33,665,166 (100%)	21,772,865 (-35%)	11,892,302 (-35.33%)	479,062 (-25.6%)
Pay per Mile Current Approach (100 pence)	33,665,166 (100%)	11,026,995 (-67%)	22,638,171 (-67.25%)	913,744 (-48.9%)
Pay per Mile Equity Option (10 pence)	33,665,166 (100%)	30,961,016 (-8%)	2,704,150 (-8.03%)	110,720 (-5.93%)
Pay per Mile Equity Option (20pence)	33,665,166 (100%)	28,256,867 (-16%)	5,408,300 (-16.06%)	221,440 (-11.9%)
Pay per Mile Equity Option (25 pence)	33,665,166 (100%)	26,904,792 (-20%)	6,760,375 (-20.08%)	276,800 (-14.8%)
Pay per Mile Equity Option (50 pence)	33,665,166 (100%)	20,144,417 (-40%)	13,520,749 (-40.16%)	553,600 (-29.6%)
Pay per Mile Equity Option (100 pence)	33,665,166 (100%)	10,241,556 (-70%)	23,423,610 (-69.58%)	956,583 (-51.2%)
Pay per Mile EV Subsidy (10 pence)	33,665,166 (100%)	31,251,178 (-7%)	2,413,989 (-7.17%)	97,142 (-5.2%)
Pay per Mile EV Subsidy (20pence)	33,665,166 (100%)	28,837,189 (-14%)	4,827,978 (-14.34%)	194,283 (-10.4%)
Pay per Mile EV Subsidy (25 pence)	33,665,166 (100%)	27,630,194 (-18%)	6,034,972 (-17.93%)	242,854 (-13%)
Pay per Mile EV Subsidy (50 pence)	33,665,166 (100%)	21,599,779 (-36%)	12,065,387 (-35.84%)	485,542 (-26%)
Pay per Mile EV Subsidy (100 pence)	33,665,166 (100%)	12,615,566 (-63%)	21,049,600 (-62.53%)	857,942 (-45.9%)

National Road Pricing (RUC) on its Way?

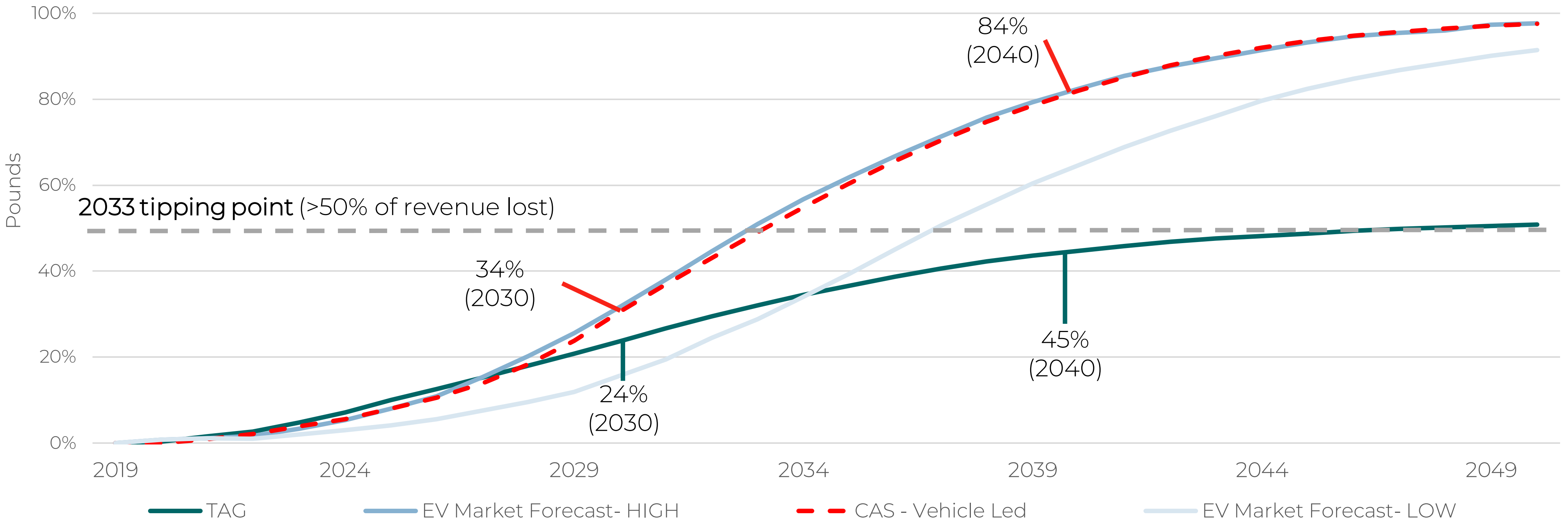


- Growing concerns that "Zero emission vehicles shouldn't mean zero tax revenue" UK Government Inquiry (Dec 2020)
- Fuel duty accounts for over 1% of all national income ~ £28bn from fuel duty and £7bn from vehicle exercise duty per annum.
- National reform likely to influence local agenda as early as 2028:

> "It will be necessary for the UK to introduce some form of road pricing to fill the fiscal hole that will be left by the erosion of fuel duty, and to prevent the low costs of electric vehicles leading to increased congestion."

- National RUC has the potential to reduce local emissions by 5-10%. It provides a means of targeting through trips and longer distance journeys which are currently largely out of scope.
- However, given the government is likely to use RUC as a replacement for existing fiscal measures, it is not deemed appropriate as a localised intervention.
- It also doesn't preclude the CA or districts developing their own charging schemes which are based on addressing travel demand, tailored to local circumstances.
- For example, CAZs and congestion charges already operate alongside fuel duty.

- No certainty IF or WHEN national RUC will be delivered



WORKPLACE PARKING LEVY (WPL)

DESCRIPTION : Workplace parking levy's (WPL) is a charge which applies to businesses who provide a set number of parking spaces within a cordon. The employer has to pay the cost or pass the cost onto the employee. For this study, the cost is to the individual user.

METHOD OVERVIEW

1. Quantify Responsive trips. Sum all commute and business trips with a destination in Cambridge and Peterborough.
2. Quantify No. of WPL spaces. No. of jobs (TEMPRO) * No. of spaces per job.
3. WPL Traffic %. No. of WPL spaces divided by total responsive trips VKM.
4. % Reduction in responsive trips VKM. Apply elasticity factor based on recent study findings.

INPUTS

No. of WLP spaces
~25,000 Peterborough
~16,000 Cambridge
Charge per space (Pence/hr)
Speed (Km/hr) and distance bands.

ASSUMPTIONS

WPL is only applicable to commute and business traffic.
Each WPL space is assumed to create one single trip in a day (Two-way).
Assumes WPL charge is a cost to the individual user.

EVIDENCE SOURCES

WPP Spaces from online (ukbusinessworkbook2022), Reduction from Literature (Options for Fiscal Measures, West of England Joind Transport Study, 2017), Tour Proportion from DIADEM Manual

SCHEME IMPACT

Scale	Cambridge	Y
	Peterborough	Y
	All CPCA	N
Time Period	All Periods	Y
	AM / PM Peak Only	Y
Vehicle Type	Car	Y
	LGV	N
	HGV	N
Genesis	Internal	Y
	Inbound / Outbound	Y
	Through Trips	N
Journey Distance	All Distances	Y
	0-5 miles only	N
Journey Purpose	All Purposes	N
	Commute / Business only	Y

RESULTS

Results (in 2031)	£458 (annual)	£1000 (annual)	£2,000 (annual)
Responsive Trips (Total trips captured by cordon)	1,429,033 (4.24%)	1,429,033 (4.24%)	1,429,033 (4.24%)
Reduction in responsive trips (vkm and %)	1,411,880 (-1%)	1,396,924 (-2%)	1,371,997 (-4%)
Reduction in CPCA trips (vkm and %)	17,153 (-0.05%)	32,110 (-0.10%)	57,037 (-0.17%)
Reduction in CPCA trips emissions (tC02e and %)	679 (-0.04%)	1,267 (-0.07%)	2,248 (-0.12%)

Headline Findings:

- ~4% of total vkm captured by Cambridge and Peterborough cordons
- ~1% to 4% reduction in Cambridge and Peterborough vkm, due to willingness to pay and comparison with price to park in public spaces.

CAR PARK PRICING STRATEGIES

DESCRIPTION : Car park pricing strategies involve increased charges to discourage car based travel by increasing the overall journey cost and providing a trip end constraint. For this study, only local authority owned car parks have been included, and the charge applies to any vehicle parking regardless of time period or journey purpose.

METHOD OVERVIEW

1. Quantify total car park traffic demand. No. of car park spaces * trip rate (car park surveys) * average trip length (NTS).
2. Quantify change in demand. Apply elasticity to responsive traffic.
3. Quantify reduction in vehicle km. Business as usual Scenario.

INPUTS

Entry and Exit Data.
No. Car parking spaces
Average trip length
Short term/Long term elasticity figures
Distance bands.

ASSUMPTIONS

Only applies to LA owned car park spaces
The charge applies to any vehicle that parks in the car park, regardless of time period or journey purpose.
Average journey distance to be applied in emissions calculations

EVIDENCE SOURCES

Car Park Spaces from Online (https://www.peterborough.gov.uk/residents/parking/car-park-locations; https://maps.cambridgeshire.gov.uk/?tab=maps), Elasticities from Literature (Hensher and King, 2001, Table 6)

SCHEME IMPACT

Scale	Cambridge	Y
	Peterborough	Y
	All CPCA	N
Time Period	All Periods	Y
	AM / PM Peak Only	Y
Vehicle Type	Car	Y
	LGV	N
	HGV	N
Genesis	Internal	Y
	Inbound / Outbound	Y
	Through Trips	N
Journey Distance	All Distances	Y
	0-5 miles only	N
Journey Purpose	All Purposes	Y
	Commute / Business only	N

RESULTS

Results (in 2031)	Cost increased to £ an hour minimum	Cost increased to £1000 a year	Cost increased to £2000 a year
Responsive Trips (Total trips captured by cordon)	324,126 (0.96%)	324,126 (0.96%)	324,126 (0.96%)
Reduction in responsive trips (vkm and %)	314,370 (-3%)	299,735 (-8%)	275,345 (-15%)
Reduction in CPCA trips (vkm and %)	9,756 (-0.03%)	24,390 (-0.07%)	48,781 (-0.14%)
Reduction in CPCA trips emissions (tC02e and %)	374 (-0.02%)	934 (- 0.05%)	1,868 (-0.10%)

Physical Demand Management – Access Constraints (LTNs)

DESCRIPTION : Physical constraints are now being deployed to restrict vehicle use in targeted locations to reach policy objectives. The study will provide a high-level indication of the potential impact of these demand management measures (capacity and access constraints) in urban centres.

METHOD OVERVIEW

1. Calculate Cordon Reduction Factor based on input cordon
2. Identify responsive trips as those within Cordon by applying Cordon factor to LA vehkm
3. Apply separate reduction factors to both responsive trips & non-responsive trips (rest)

INPUTS

1. Reduction Factors as per Empirical Evidence
2. Responsive decreased by 32.7%, Non-Responsive increased by 1.3%

ASSUMPTIONS

- Based on Input Cordon, the proportion of Veh km for cordon is estimated as proportion of LA Veh km
- Reduction Factors from empirical studies' data are applied to responsive Veh km.
- No information on sizes of study sites to choose selectively comparable to input cordon, to allow for modification in Reduction Factor
- Applied only to Cambridge & Peterborough

EVIDENCE SOURCES

Literature (https://www.theguardian.com/uk-news/2023/jan/19/low-traffic-neighbourhoods-boundary-roads-london)

SCHEME IMPACT

Scale	Cambridge	Y
	Peterborough	Y
	All CPCA	N
Time Period	All Periods	Y
	AM / PM Peak Only	Y
Vehicle Type	Car	Y
	LGV	Y
	HGV	Y
Genesis	Internal	Y
	Inbound / Outbound	Y
	Through Trips	N
Journey Distance	All Distances	Y
	0-5 miles only	N
Journey Purpose	All Purposes	Y
	Commute / Business only	N

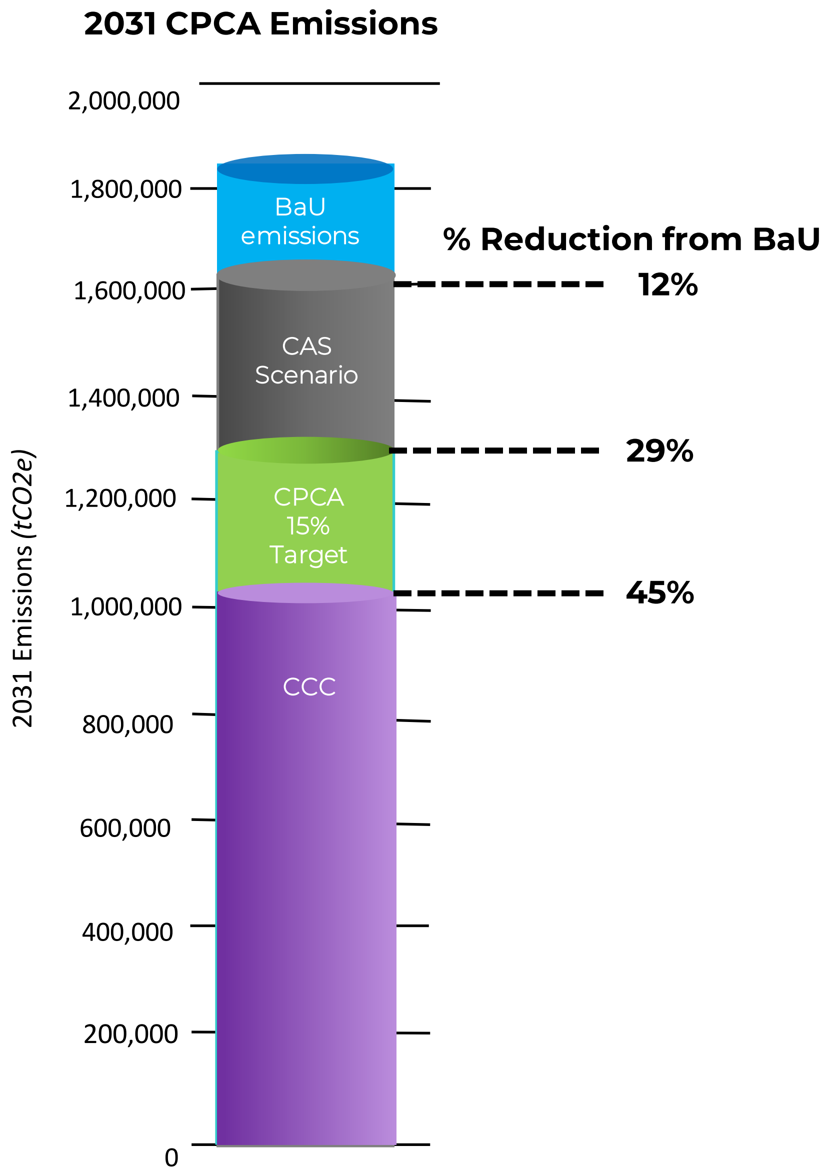
RESULTS

Results (in 2031)	Access Restraint
Responsive Trips (Total trips captured by cordon)	2,801,843 (8.32%)
Reduction in responsive trips (vkm and %)	1,885,640 (-32.7%)
Reduction in CPCA trips (vkm and %)	842,789 (-2.5%)
Reduction in CPCA trips emissions (tC02e and %)	**42,252 (-2%)**

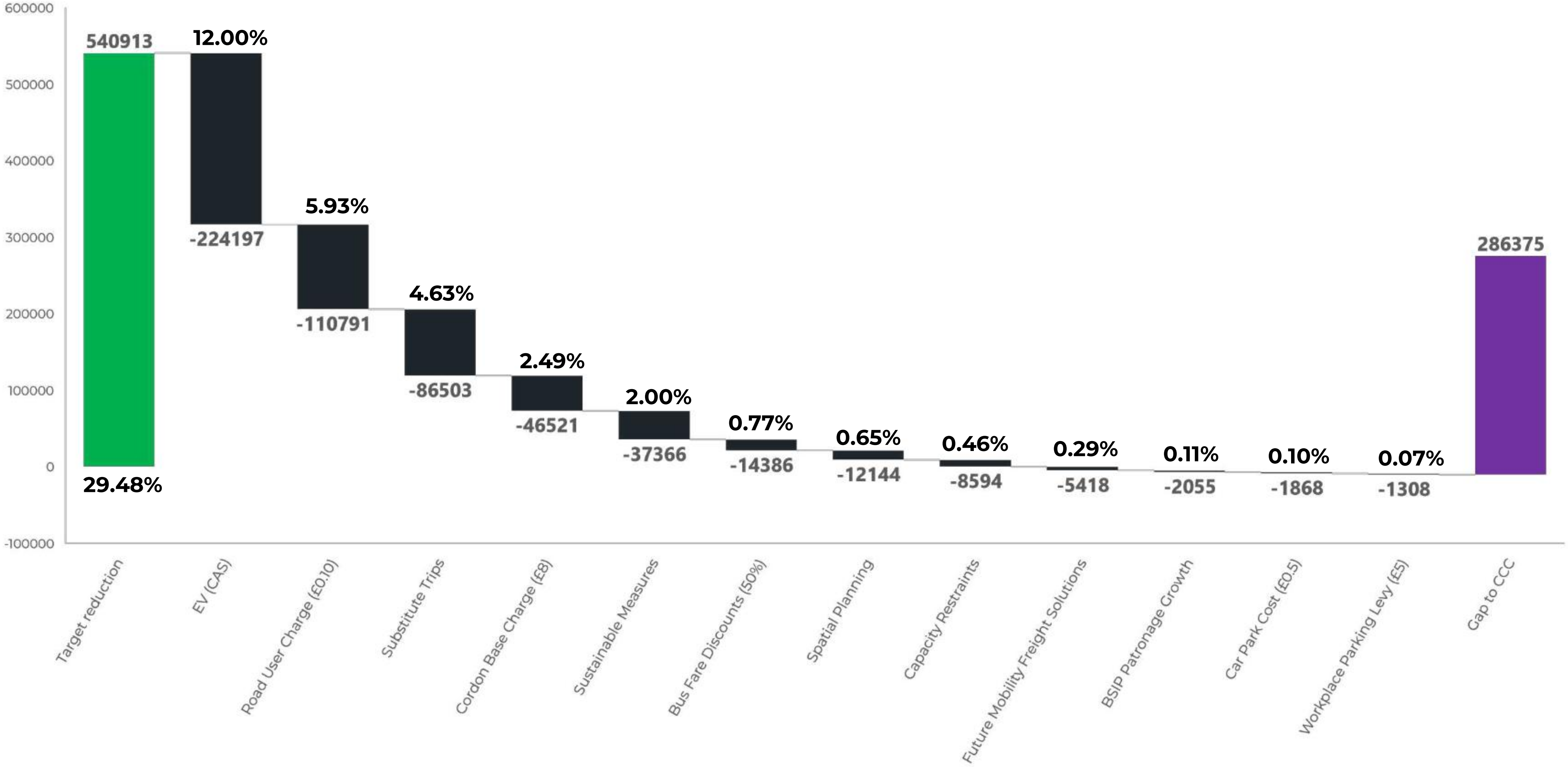
Intervention Impact Summary (2031) vs Required Outcomes

Demand Management Measures	Reduction in CPCA emission (tCO2e)	% Reduction in CPCA emissions
Road User Charge - £0.25 per km	239,531	12.80%
Road User Charge - £0.20 per km	191,625	10.30%
Road User Charge - £0.10 per km	95,812	5.10%
Cordon Base Charge - (£10 per day)	46,446	2.50%
Cordon Base Charge - (£8 per day)	37,157	1.99%
Cordon Base Charge - Peak period only (£8 per day)	15,228	0.82%
Capacity Restraints (City Centre Focus)	8,521	0.50%
Workplace Parking Levy - £2 per day (£458 annually)	679	0.04%
Workplace Parking Levy - £5 per day (£1000 annually)	1,267	0.07%
Car Park Cost increased by 10%	374	0.02%
Car Park Cost increased by 25%	934	0.05%

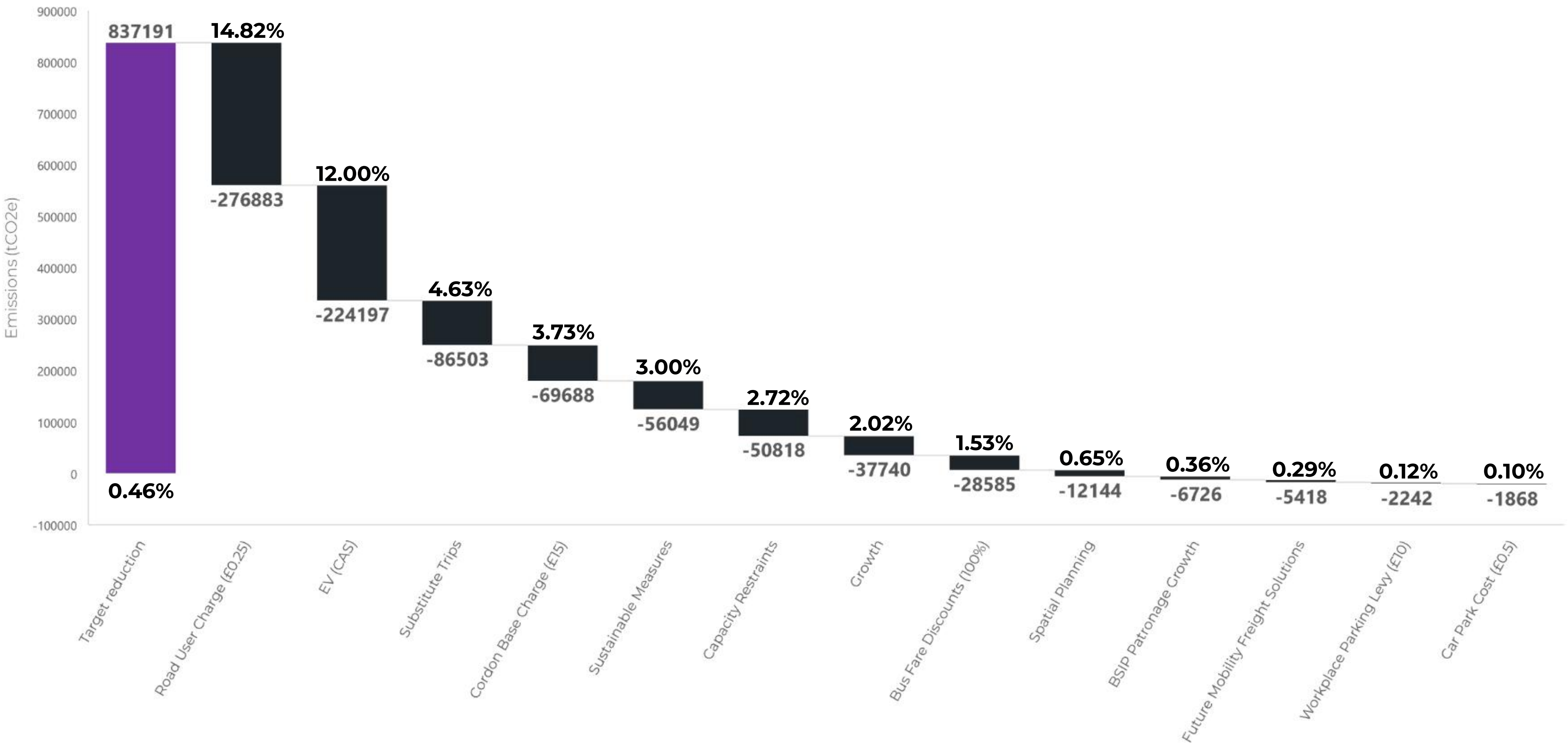
Influencing Factors	Reduction in CPCA emission (tCO2e)	% Reduction in CPCA emissions
Emissions in CPCA influence (removing through trips)	765,994	41.00%
Substitute Trips / Impact of online services	86,595	4.63%
Limiting Traffic Growth (10% reduction)	32,848	1.77%
Spatial Planning / Self Containment Test	12,161	0.65%
Bus Fare Discounts (50% reduction)	14,313	0.77%
Future Mobility Freight Solutions	5,357	0.29%
BSIP Patronage Growth	2,004	0.11%



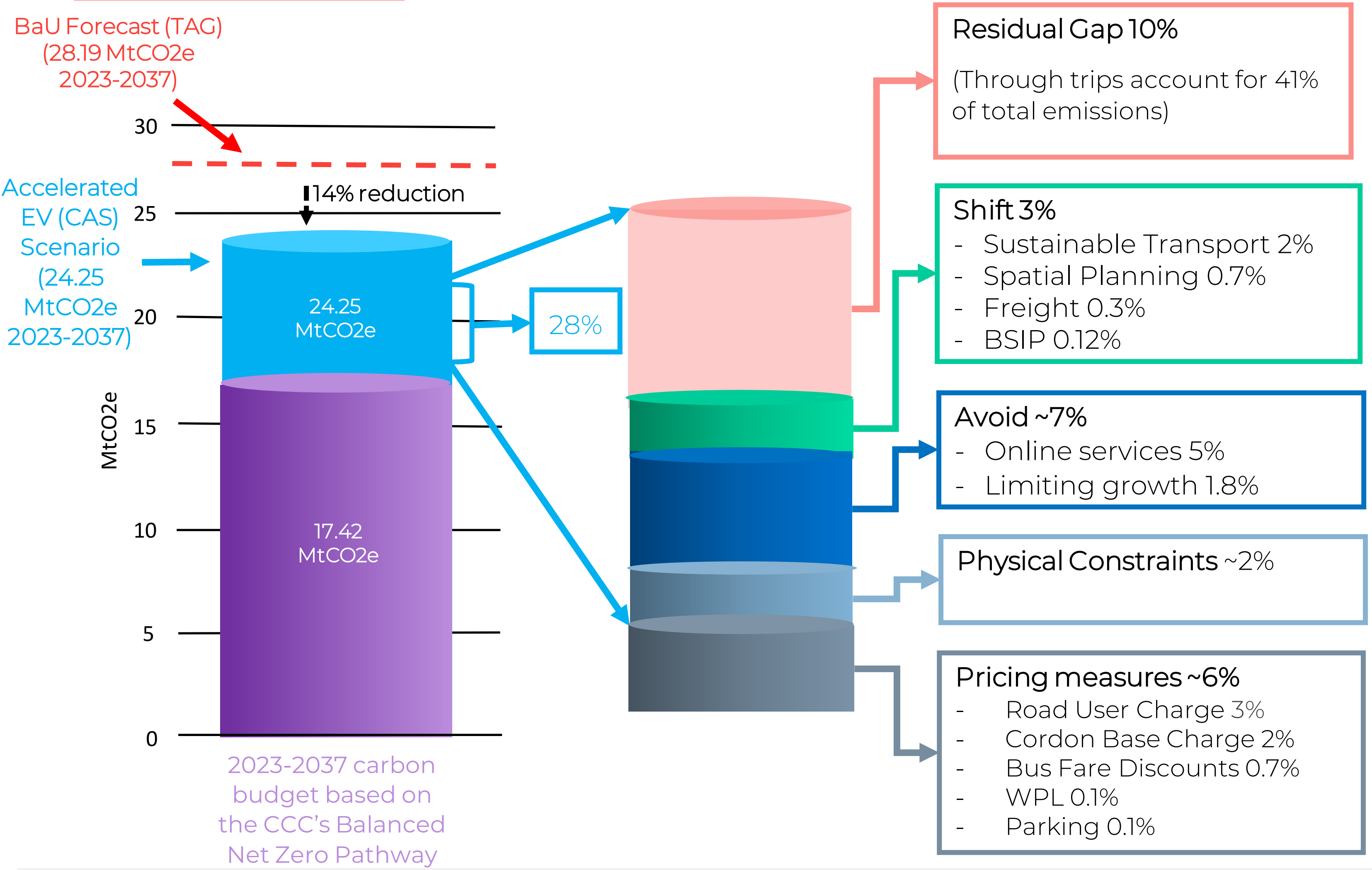
Scale of Ambition Required to Achieve 15% Reduction Policy Target in 2031



Scale of Ambition Required to Achieve Reduction in line with CCC (2031)



The Challenge to Complying with Carbon Budget 6 (2037)?



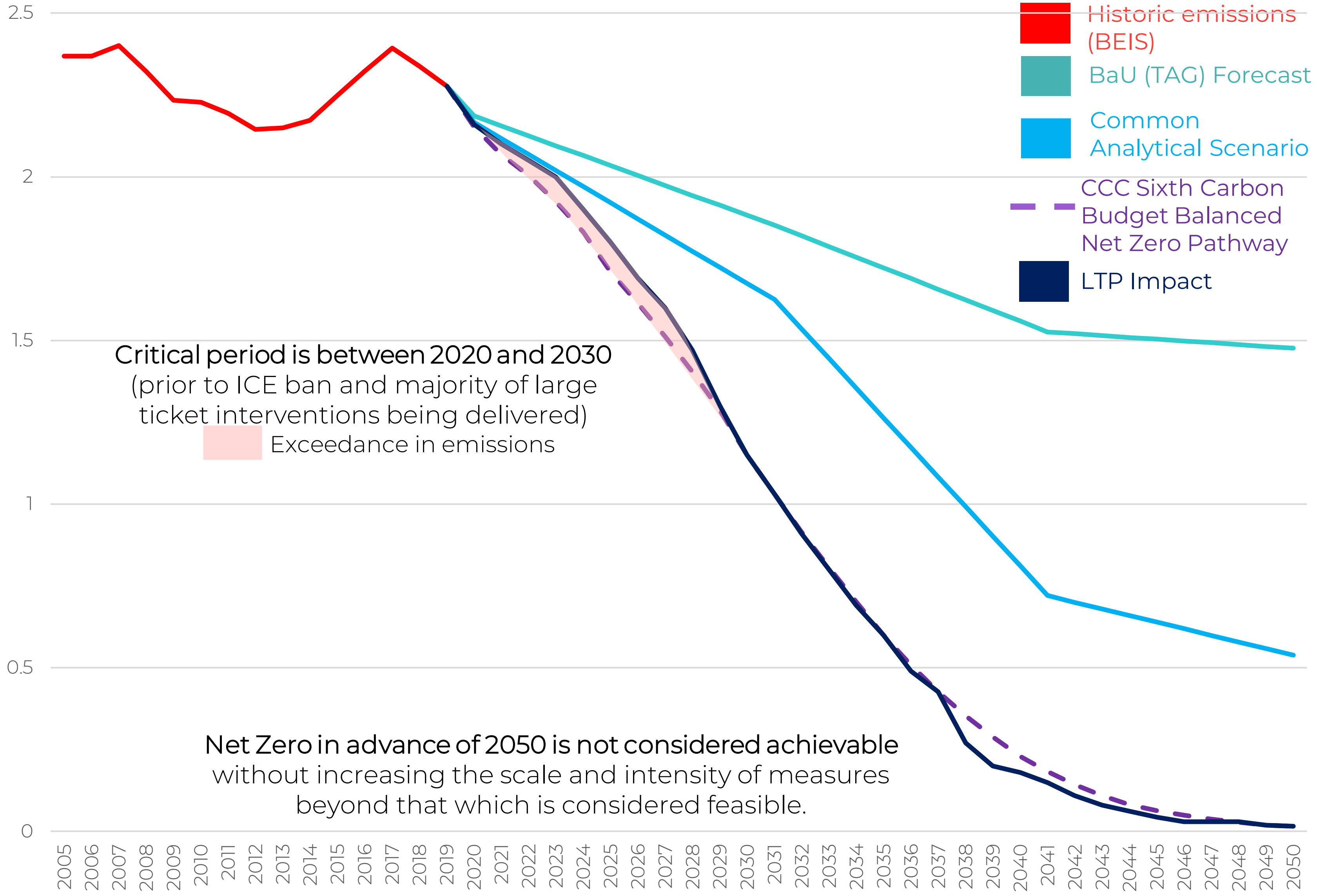
2023 - 2037 Headline Findings:

- Slide 39 shows an ambitious LTP can achieve up to a 29% reduction in 2031.
- However, the potential scale of carbon reduction achievable within carbon budget 4 (2023) to carbon budget 6 (2037) is largely dependent on the implementation year of the large ticket items (pricing measures, demand management and sustainable transport infrastructure).
- If disincentives are not delivered until post 2027, there is insufficient time to close the emissions gap completely. Particularly given emissions outside of the LTP influence (through trips and rail).

Emission estimate scenario	Carbon budget periods (MtCO2e)			
	CB 4 2023-2027	CB 5 2028-2032	CB 6 2033-2037	CB 4-6 2023-2037
BaU	10.17	9.41	8.61	28.19
CAS	9.60	8.33	6.32	24.25
CCC	8.59	5.79	3.04	17.42
Exceedance	1.01	2.54	3.28	6.83

Assumptions
Please note the % impact shown reflects the potential carbon impact up to 2037. Assuming the following implantation years:
National Road User Charge (2030) | Cordon Base Charge (2027) |Physical Demand Management (2025) | All other measures – 2023
The cumulative impact of measures across their life cycle will be significantly.

The extent to which Net Zero by 2050 can be achieved?

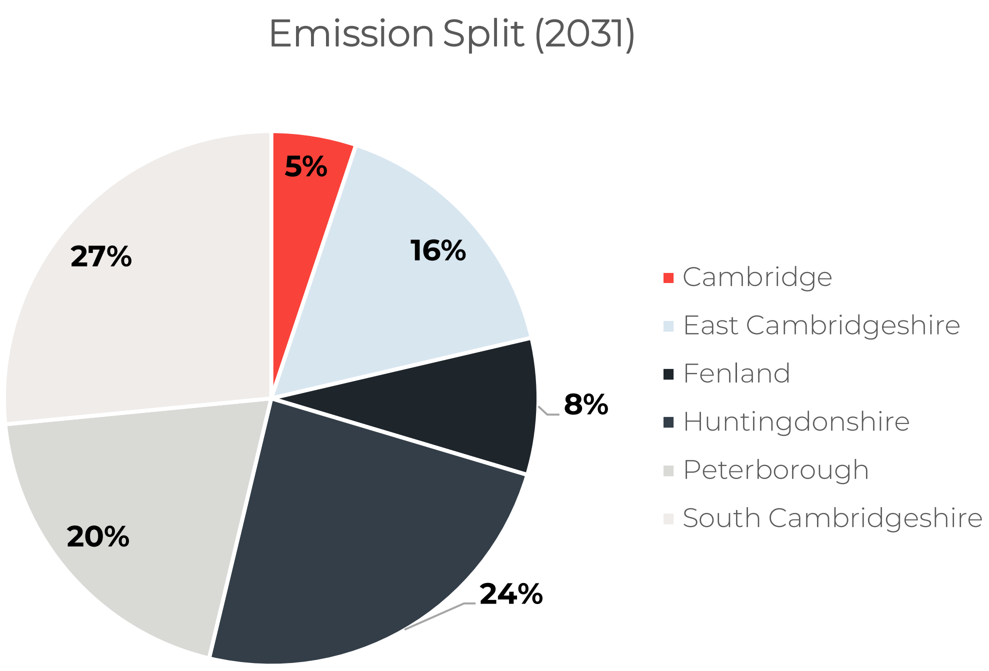


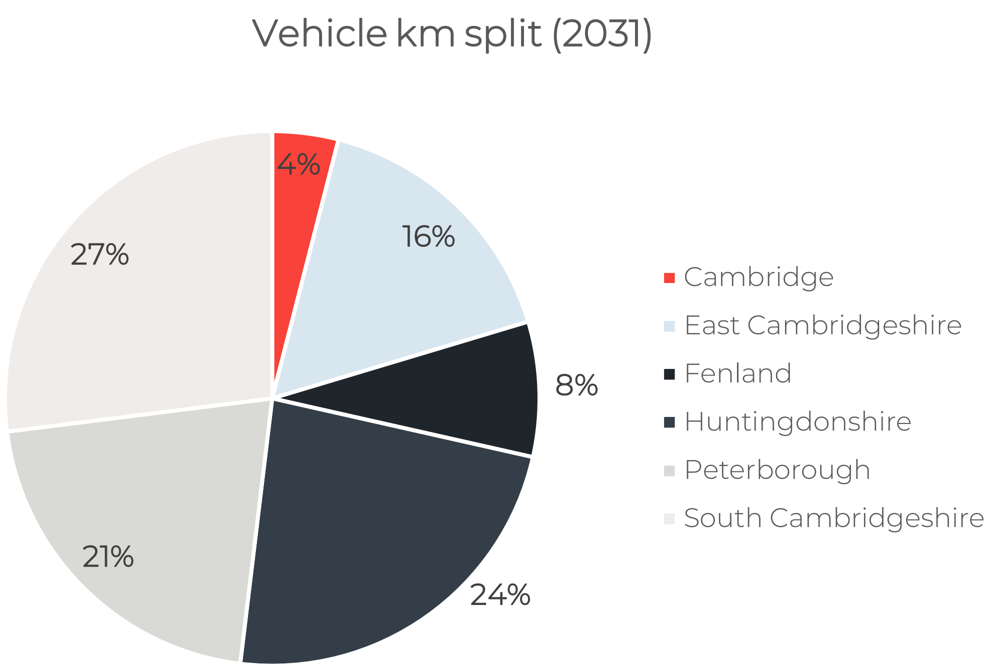
Headline Findings:

- The CCC balanced NZ pathway estimates CPCA has a budget of 47.98 MtC02e of cumulative emissions between 2023 and 2050.
- This requires a reduction of 14.73 MtC02e from the CAS cumulative emissions 33.25 MtCO2e
- The graph presents an indicative scale of impact of an ambitious LTP package of interventions as listed below.
- This is sufficient to comply with the CCC pathway for Net Zero by 2050 (<19.02 MtCO2e).

Intervention	Delivery Assumption	Intensity
Road User Charge	2030	£0.10 per km
Cordon Base Charge	2027	£10.00
WPL	2027	£5 a day
Bus Discount	2027	50% discount
Parking Charges	2025	25% increase
Demand Management	2025	N/A
Avoid	2023	N/A
Sustainable Transport	2023	N/A
BSIP Target	2023	N/A
Spatial Planning	2023	N/A
Freight / FM	2023	N/A
Limiting Traffic Growth	2023	10% reduction

Geographical Challenges





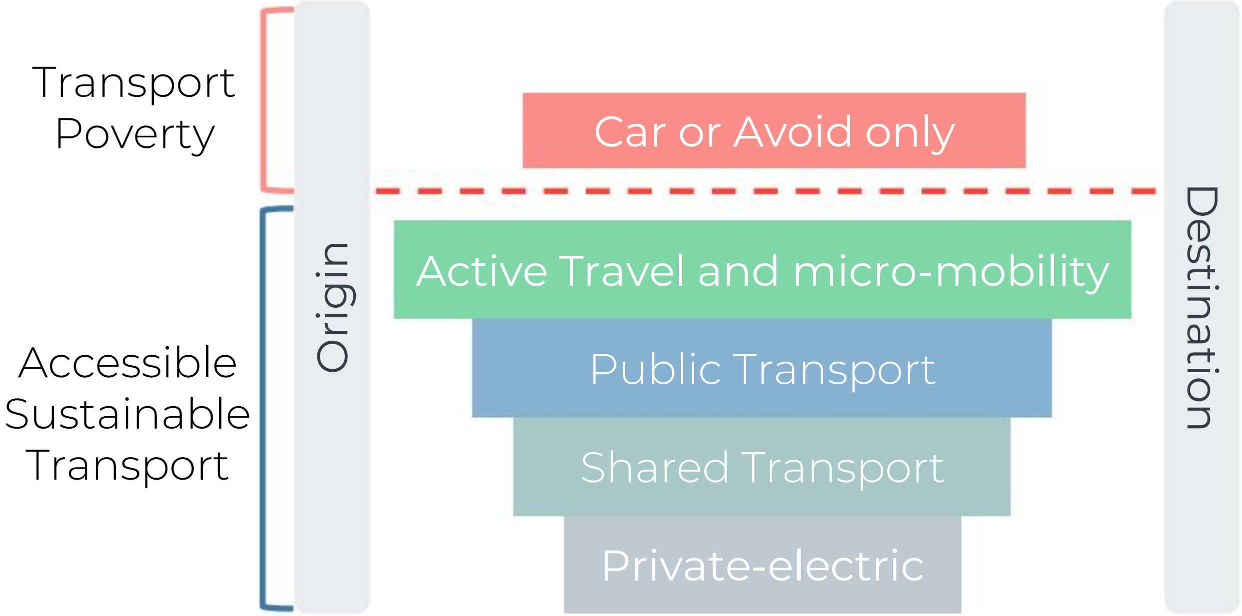
Headline Findings:

- Cambridge accounts for 5% of all emissions CPCA emissions
- Urban areas offer the greatest opportunity for decarbonisation in the short term, but to achieve levels of decarbonisation in line with carbon budgets equitably will require a more holistic place-based approach

Importance of Sustainable Transport Options (Enablers)

- The Carbon Assessment Framework shows that the majority of traditional interventions (active travel schemes etc), can only return modest carbon savings. However, It is important to acknowledge their significance in decarbonisation.
- Without these “enablers” in place which provide attractive sustainable travel choices, interventions which are necessary to disincentives vehicle travel cannot be delivered without negative socio-economic impacts.
- For example should the CA or districts progresses a road pricing scheme residents without suitable travel choice options will have three options: 1) pay the charge, 2) reduce their travel or 3) avoid travelling all together. The lowest income groups will be worst affected, further widening the carbon and poverty gap.
- A primary role of the LTP is therefore to identify places in need of sustainable transport options. This will unlock the decarbonisation potential of CPCA, whilst also supporting a number of wider policy objectives (see slide 43).

Transport accessibility vs Transport Poverty:



‘Entrenched car culture’ leaves millions of Britons in transport poverty

“For the average household transport is the single biggest outgoing” ~ approx. 10% of income.
Up to 23% for lowest income groups.
21 million UK households in transport poverty (racfoundation.org)

How Should Interventions be Sequenced?

- Both sustainable travel choices (i.e. infrastructure improvements) (carrots) and demand management (sticks) are needed
- Demand management risks negatively impacting the ability of residents to travel (i.e. transport poverty) unless sustainable and affordable alternative travel choices are provided
- Ideally, to mitigate this risk there would be a comprehensive sustainable travel network in place before disincentives to car use (e.g. road pricing) are implemented – unlikely to be possible on timescales needed to decarbonise
- Likely to be a realistic middle-ground – some negative impacts. Targeting of measures can help mitigate impacts e.g.:
  - Prioritising infrastructure improvements in areas with worst sustainable transport access
  - Intensity or location of demand management reflects travel choice and social factors

Required reduction in demand / use of ICE vehicles

Likely in the range **21-38%** reduction in car kms travelled (CERP)

Scenario

Short-term, high-intensity	**Realistic**	**Idealistic**
Incomplete sustainable travel network / choices.	Reasonable but incomplete sustainable travel choices	Comprehensive sustainable travel choices and behavioural change campaigns

Action

Implement demand management measures to enable demand to fall quickly

Short-term, high-intensity	Realistic	Idealistic
• Car use becomes unaffordable to many, but absence of sustainable travel choices • Travel therefore not possible or affordable for many • Social, economic and political implications	• Some negative impacts • Equity issues somewhat mitigated through targeting of measures	• Travel can continue but on sustainable modes • Equitable transition through availability of viable, affordable means of travel • Co-benefits of improved health, levelling up, placemaking, etc. Subject to local retention of revenues (not guaranteed).

How Can Transport Decarbonisation Align With Wider Policy Agendas?

Demand management measures risk some adverse consequences including:

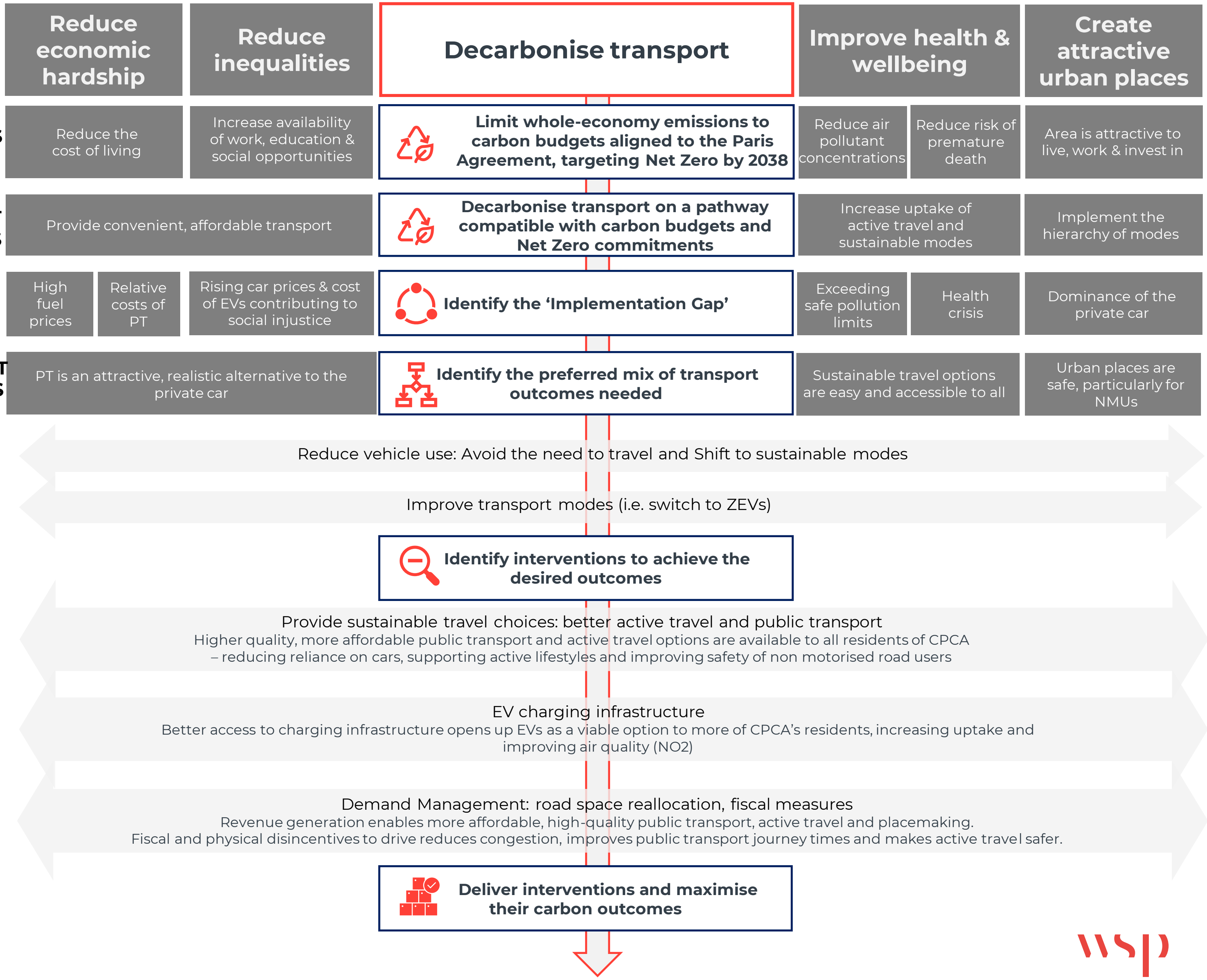
- Increased cost to motorists (short term)
- CPCA at risk of being at a competitive economic disadvantage if neighbouring regions do not simultaneously increase charges to motorists – this is only a risk however and can instead bring opportunities as it has in London.

The interventions necessary for decarbonisation however also offer significant benefits to alternative policy agendas.

As shown, delivery of ambitious demand management measures in parallel to improved sustainable travel choices has the potential to support all four policy agendas presented.

The 'transport outcomes' identified share the same vision as those associated with transport decarbonisation.

The urgency and commitments made to tackle climate change offer a major opportunity and represent a strong case for change for places to shift away from the status quo, and create places for people that are equitable, safe, healthy, and prosperous.



What Could a 'Do-Minimum' Future Look Like?

An illustrative scenario without bold intervention

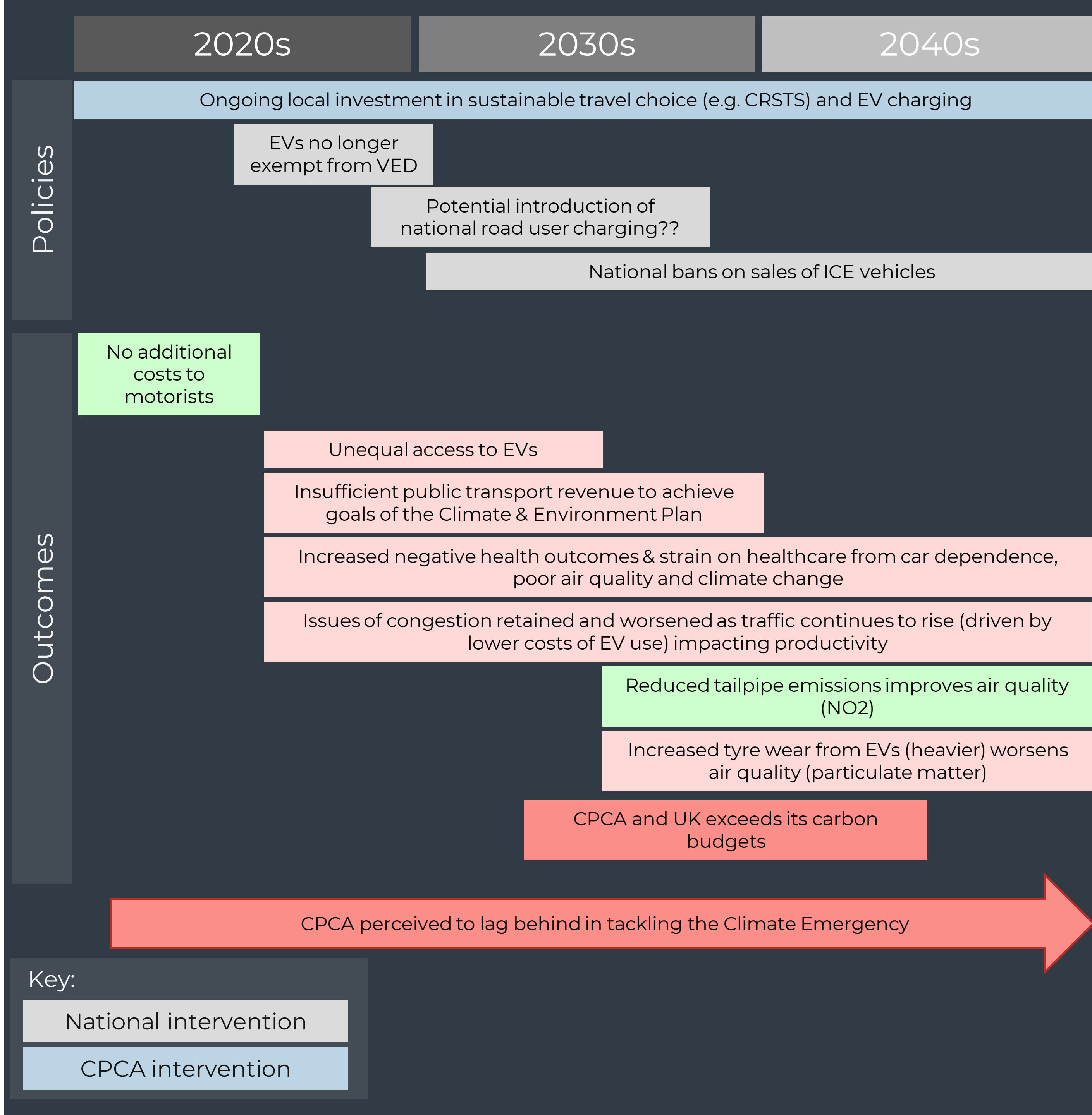
- Interventions necessary to decarbonise will be controversial with some adverse impacts. However, failing to take any action would also present significant and unfavourable impacts.

A potential 'Do-Minimum' policy scenario

- Assumes current and foreseeable policies continue, with no form of additional or complementary local or regional pricing measures implemented in the CPCA.
- As EVs are no longer exempt from Vehicle Excise Duty (VED) from 2025, some form of revised road pricing nationally (see slide 39) is by no means a certain policy intervention but remains possible for budget and decarbonisation reasons. It is nonetheless assumed not be enough to create a significant behavioural change and reduction in vehicle use.
- Without local action there is therefore assumed to be no significant intervention to drive a demand reduction at the scale required and the application of VED to EVs may remove incentives to EV uptake.

Potential outcomes

- Failure to be Net Zero by 2038 or 2050 or provide a 'fair' contribution to national carbon budgets
- A lack of new revenue sources across CPCA could risk a failure to deliver required sustainable infrastructure and associated transport objectives



What Could a Future of Achieving Transport Carbon Budgets Look Like?

An illustrative scenario with bold intervention to decarbonise transport

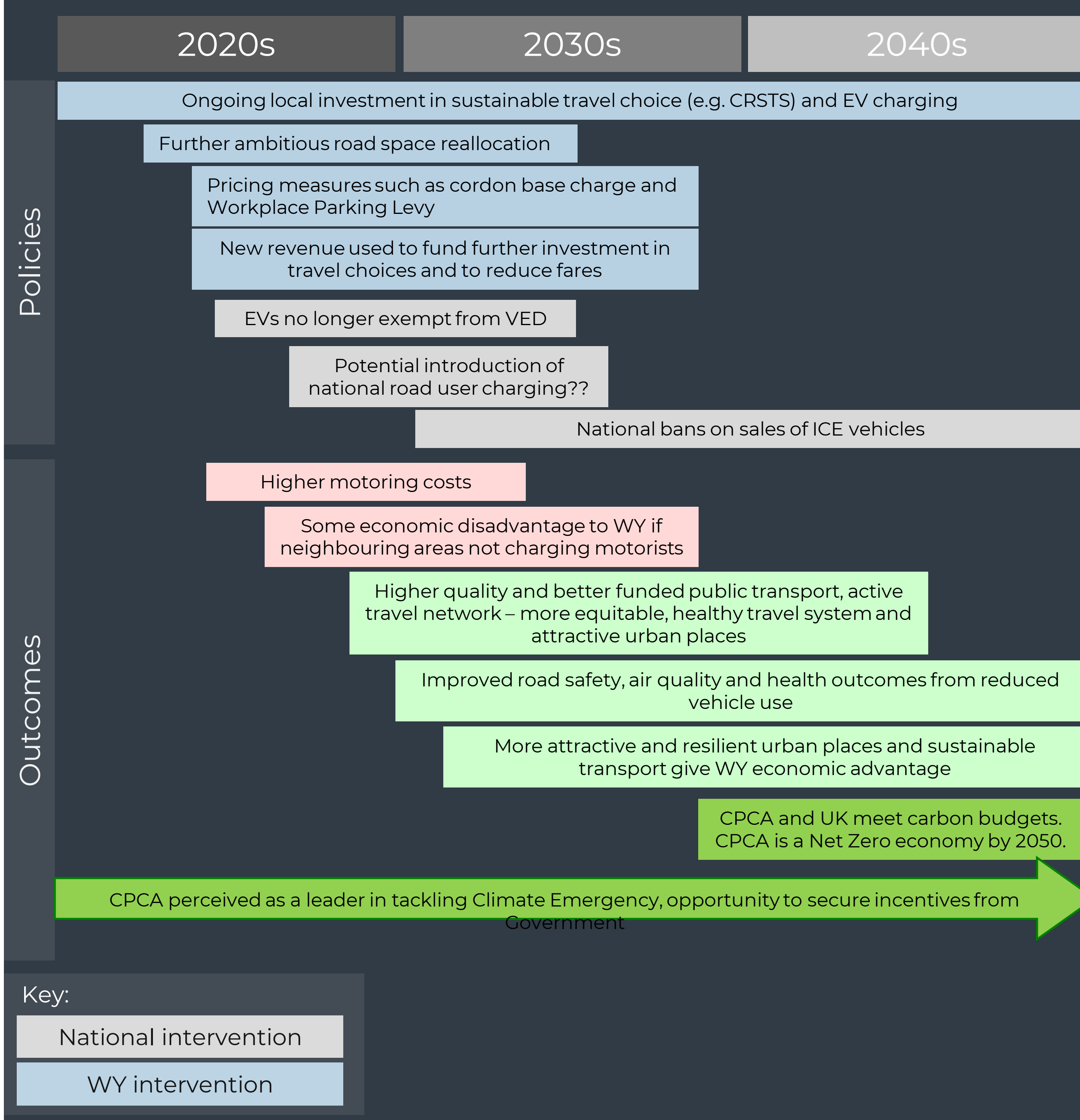
- Assumes the bold interventions needed to reduce car use at the scale indicated in this study are delivered.

A potential 'Do-Maximum' policy scenario

- Ongoing investment in sustainable travel choices and EV charging, alongside bolder demand management measures in the CPCA.
- Local pricing measures are in addition to any potential national road pricing schemes.

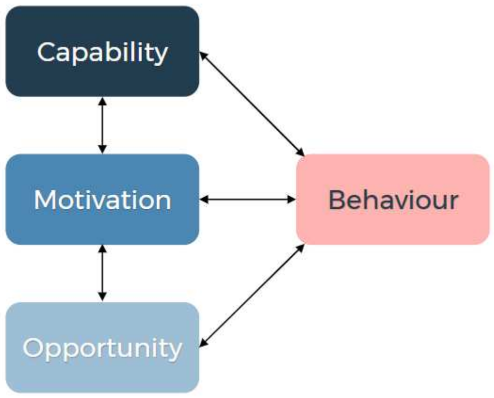
Potential outcomes

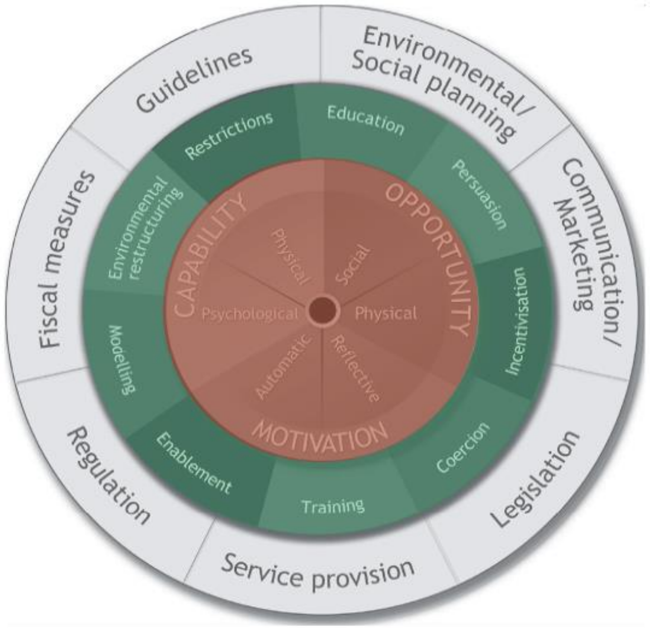
- Pricing measures, risk adverse financial consequences on residents alongside competitive disadvantage if adjacent areas do not introduce equivalent charges. Continued investment in sustainable travel alternatives mitigates these impacts.
- Retaining locally the revenue from pricing measures and investing it in public transport and active travel networks, and to reduce public transport fares, helps achieve policy outcomes.
- In this scenario, CPCA could meet statutory carbon budgets and is Net Zero by 2050. Wider action and/or more ambitious intervention is needed to achieve Net Zero in advance of the national target (a more nuanced local target may be required that focuses on emissions in the CA and districts' influence).



Limitations to modelling changes in travel behaviour

- Due to the nature of this scoping study, this is a high-level, initial assessment – it must be acknowledged that there are a number of gaps in the data and tools required to accurately assess impact of interventions on travel behaviour.
- Travel behaviour is affected by:
  - Capability – Does the user have sufficient travel choices available?
  - Motivation – Why should the user considering switching?
  - Opportunity – What does the user seek to gain from changing travel mode? Faster journey time, productivity, affordability etc
- This study reports the sum of individual scheme assessments – it does not account for expected in-combination benefits from delivery of the programme as a whole or with other current or future policies or interventions. It is expected that the benefit would as a result be greater than the reported sum of the parts.





Source of Behaviour
Intervention functions
Policy categories

Example:

A new cycle lane is delivered and achieves only modest abstraction from vehicle travel demand.

Through the LTP, work from home provision is enabled, improved access to public transport and interchange facilities (bus, rail, Mass Transit) alongside shared mobility alternatives (car club, shared e-bike, e-scooter provision) between the users origin and destination are provided. The user now has multiple attractive sustainable travel choices which together can influence the users decision.

= the user will have capability, motivation and opportunity to change travel behaviour.

Are Highway Schemes Compatible with Net Zero?

What do we mean by a highway scheme? Any intervention that improves capacity or journey times for general traffic

New roads — Capacity enhancements — Overtaking lanes — Junction realignments — Signal upgrades

What carbon impact can they have? Varies widely by nature and characteristics of a scheme but can include....

↑ Capacity and/or journey time improvements > induced demand > increase in vehicle use

Counter to need to reduce vehicle use

↓ More efficient traffic flows > reduced rerouting and stop-start traffic > reduced fuel consumption

Not Avoid, Shift or Improve – won't decarbonise transport at scale or pace required

↑ Construction and maintenance > demand for materials and energy > capital and operational carbon emissions

Can be significant – new roads can be over 100,000 tCO_2e for construction. This can outweigh benefits from other interventions (e.g. modal shift)

How to determine whether a highway scheme should go ahead?

Carbon isn't the only strategic priority... but a highway scheme would be tested against these questions >>>>

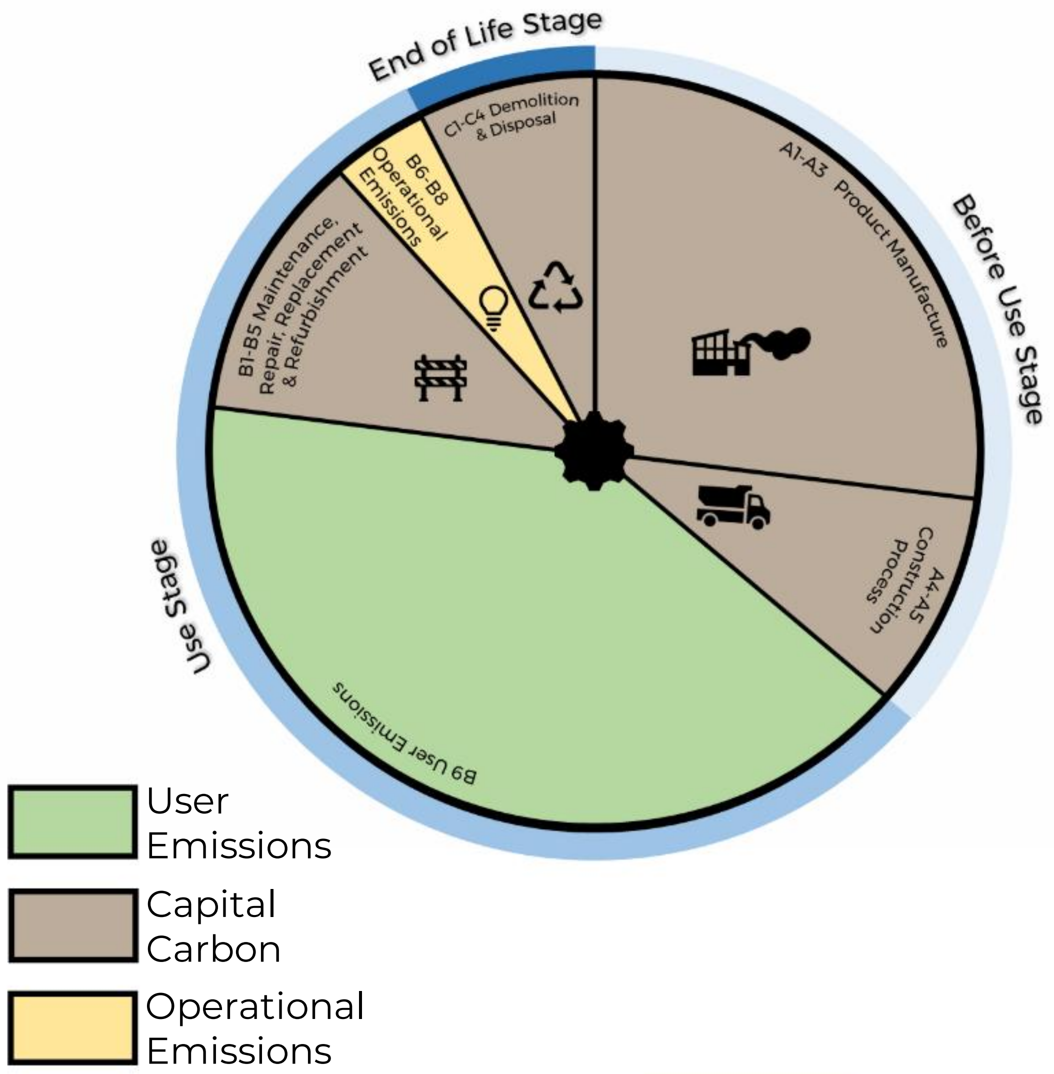
Without a sound case that answers these questions there is significant risk of legal challenge.

- Is it likely to induce additional vehicle demand?
- Does it have a robust case under a low carbon future (e.g. reduced vehicle use?
- Is the scale of impact going to affect your ability to meet carbon budgets and Net Zero? E.g. outweigh reductions from other interventions
- What if ambitious carbon management is applied through scheme development to reduce its impact?
- Is it essential for other policy objectives?
- Can these objectives be met through alternative measures?

Alternative decision-making approach: carbon budgets and new infrastructure development (decarbon8.org.uk)

Infrastructure Carbon

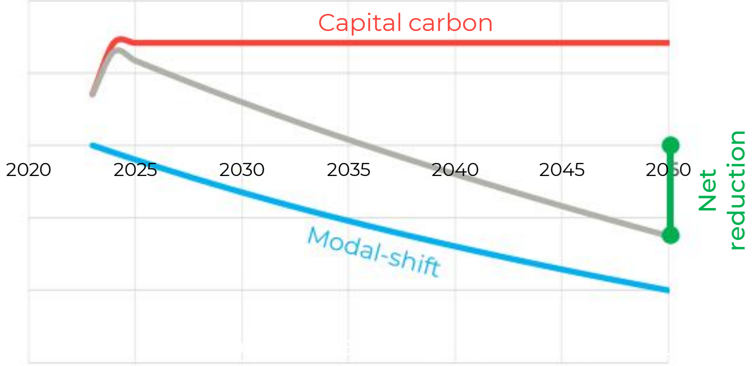
What is it?



Carbon Budgets and Pathways → Identify the 'implementation gap' → Identify transport outcomes → Identify interventions

How important is it?

- Carbon budgets and Net Zero won't be met without decarbonisation of the economy as a whole
- Infrastructure carbon impacts (notably capital carbon) of infrastructure projects can be significant
- Whole-life carbon assessments for sustainable transport schemes have often shown either a significant 'payback period' (see example below) or capital carbon outweighing user emission benefits



How should it influence transport policies?

- The greatest opportunities to reduce infrastructure carbon impacts are at the earliest stages of decision making – as such the QCR guidance will encourage LTAs to consider it in LTP development
- Follow the PAS2080 carbon reduction hierarchy – notably 'build nothing' or 'build less'

wsp

Best Practise Example: A10 Scheme

Scheme: The A10 stretch of road between Ely and Cambridge is a single carriageway road that links up to Kings Lynn in the North and London in the South. It is extremely busy with public transport, farm traffic, commuters, freight and through-traffic.

Optioneering: Seven options have been shortlisted which include a range of possibilities from improving junctions to creating a completely new dual carriageway.

Original Assessment: Limited appraisal of embodied and user impacts. Lack of evidence to support an informed decision on carbon grounds.

Reassessment

- Re-calculated user and embodied impact of options.
- Contextualise results against policy objectives (15% reduction in car traffic)
- Identified mitigation measures and provided evidence to inform decision makers

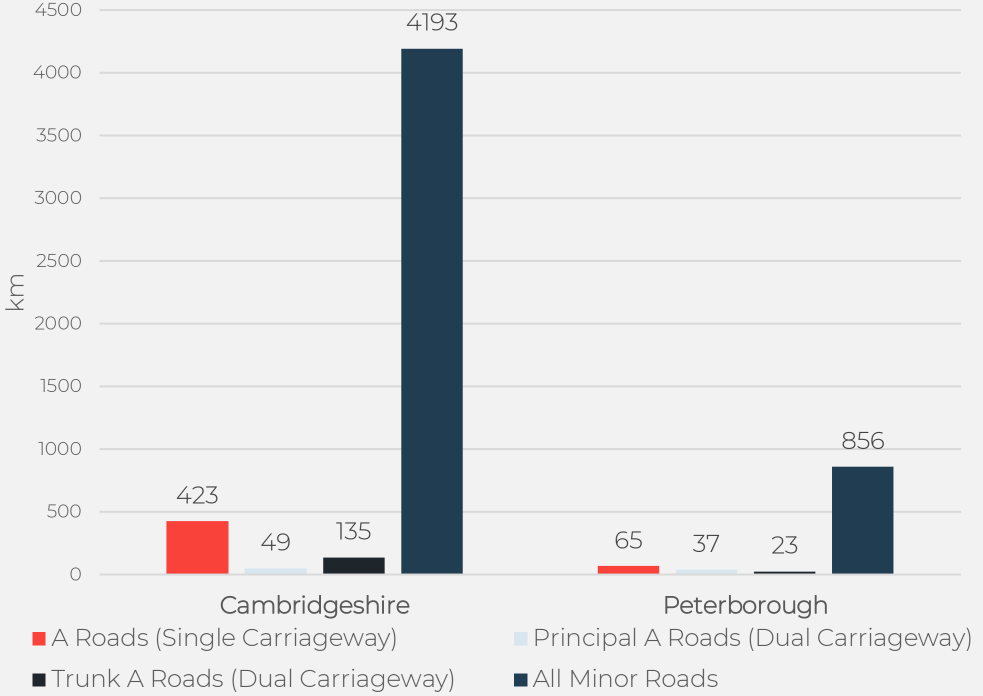
Required Next Steps across Highway Schemes:

- Opportunity to rescope if considered early enough (PAS2080)
- Importance of re-assessing legacy schemes to quantify their impact

Infrastructure Carbon

What about existing infrastructure? This can be a significant and ongoing impact….

Breakdown of road lengths (exc. motorway) by LA (DfT road length statistics)



Total road network under LA control in CPCA

For CPCA a total of….

- 488 km of A-roads (single carriageway) (at least 7.3m wide)
- 86 km of Principal A-roads (dual carriageway) (at least 14.6m wide)
- 157 km of Trunk A-roads (dual carriageway) (at least 14.6m wide)
- 5,049 km of minor roads (at least 3.65m wide)

Equating to at least 25541 km2 of carriageway surface

Potential scale of carbon impact from resurfacing

Approximately 10,216 tCO2e annually

Assuming:
- Carriageways are resurfaced every 10 years
- 1 m2 of resurfacing comprises 0.004 tCO2e
- Total resurfacing over 60 years is spread evenly on an annual basis

This is a crude, high-level estimate provided only to give an indication of the potential scale of impact.

What are the implications for an LTP and QCR?

- This is an ongoing source of LTA emissions that need to be reduced in line with carbon budgets and Net Zero
- Intervention is needed – industry is unlikely to decarbonise quickly enough for business-as-usual maintenance practices to be compatible with carbon budgets
- Existing infrastructure (particularly for sustainable modes) needs to be maintained if travel is to continue
- Extra funding may be needed to decarbonise maintenance practices – the savings of such interventions can be captured in QCR

External Influence & Governance

- Not all emissions are within the Combined Authority and districts influence so collaboration and exertion of influence on others will be needed
- Other authorities have later Net Zero targets and may as a result act slower than the CPCA
- Opportunities from collaborating e.g. with National Highways sending clear signals regarding commitment to low carbon construction to incentivise investment from supply chain in low carbon materials and methods
- Changes in governance will be needed to deliver the ambitious change needed. Revisions to the CA's assurance process to include meaningful carbon impact assessment is a positive step.
- The QCR process can result in an LTP that is credible and ambitious on carbon reduction and provides a robust strategic case for change - supporting delivery of contentious policies

National Highways commitments in their Net Zero Strategy:

- Net Zero corporate emissions by 2030
- Net Zero maintenance and construction by 2040
- Net Zero road user emissions by 2050

Network Rail:

- Committed to a carbon neutral railway by 2050 (2045 in Scotland)
- Traction Decarbonisation Network Strategy (TDNS) published in 2020 – includes ambitious targets for electrification. Only 46% electrified now.
- 2021 Spending Review considered TDNS to be unaffordable – therefore no identified funding for decarbonising rail

Other local, regional and national transport authorities:

- Interventions by neighbouring authorities will impact emissions in the CPCA
- Transport for the North (TfN)'s decarbonisation strategy
- Further national intervention? re. potential for road user charging

Other areas to influence and collaborate with:

- DfT funding and policy
- Spatial planning policy and decisions
- Bus operators
- Logistic companies
- Construction industry
- Businesses
- The public

Conclusion

Phase 1 and 2

- None of the transport decarbonisation pathways in line with statutory carbon budgets and Net Zero by 2050 will be met under even the most ambitious scenarios of EV uptake – intervention is needed to close a significant 'emission gap'
- The infrastructure measures assessed during phase 2 will not achieve the scale of carbon reduction required to achieve
- Net Zero or compliance with carbon budgets is not achievable without further supporting measures.
- A significant proportion of emissions (~40%) are outside the direct influence of the LTP to address (through trips and rail)

Phase 3

- Achieving a 15% reduction in vehicle km (from a 2019 baseline) is considered a suitable level of ambition for CPCA to target through the LTP. Analysis shows this level of reduction is sufficientt to align with the CCC Sixth Carbon budget up until 2028. Beyond this date, further reductions in vehicle travel should be targeted.
- Modelling of "influencing factors" in decarbonisation shows that there is no one intervention which can achieve the scale of reduction in vehicle use required. Of the measures tested, avoid measures (improved digital connectivity, spatial planning) and demand management (pricing strategies and physical measures) have been found to have the greatest influence.
- Individual measures have then been packaged together and tested against the CPCA target and the CCC pathway aligned to Net Zero target for 2050. Analysis shows that an ambitious programme of interventions (at intensities which are deliverable) will achieve the CPCA target but will still leave a residual gap in cumulative emissions against the CCC pathway. This is partly due to the scale of emissions outside of the scope of influence of the LTP (~40% through trips).
- When forecast up to 2050, the ambitious LTP is sufficient to comply with the CCC pathway for Net Zero by 2050. Net Zero in advance of 2050 is not considered achievable through the LTP without delivering interventions beyond the scale and intensity which is considered feasible.
- The scenario tests have highlighted the importance of the timing and sequencing of interventions.. It is critical that the LTP considers all necessary hooks to secure further feasibility into the delivery of the required interventions. The higher the exceedance in emissions over the next 7 years, the more politically challenging will be the required package of measures post 2030.
- Infrastructure carbon must be carefully considered for all new schemes and ongoing maintenance. If not managed correctly, infrastructure carbon risks whole-economy carbon budgets being missed.

Next Steps

This presentation summarises the findings from the study. Recommendations for additional tasks and next steps are provided below.

QCR Guidance Key Steps

QCR Guidance Key Steps	Next steps
Step 1. Estimate current and future user emissions	• Completed
Step 2. Establish a local transport decarbonisation pathway	• Agree a transport decarbonisation pathway (i.e. 15% vkm reduction) to be presented as the targeted level of ambition in LTP4 • Consider developing a Theory of Change model to demonstrate the logic of how decarbonisation outcomes will be achieved – this can inform objectives in LTP4 and communicate where external inputs are needed
Step 3. Consider carbon in the generation and appraisal of interventions and policy options for an LTP	• Review findings of this study to inform the generation of a longlist of interventions for LTP4 based on the characteristics of different place types • Develop carbon criteria for an appraisal framework (e.g. an MCAF) to sift that longlist to a shortlist • Consider further development and analysis of demand management measures .This can inform engagement prior to their inclusion in the LTP.
Step 4. Estimate the carbon impact of the intervention programme	• Quantify the impact of a short-list of interventions – drawing upon findings of Phase 2 and inclusion of any additional policy levers identified in Phase 3. This will need to consider the influence of highway schemes.