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DEADLINE D8 SUBMISSION
(Late submission for D8: May 18th 2023)

Contents

DEADLINE D8 SUBMISSION	1
Contents	1
1 INTRODUCTION	2
1.1 Key dates going forward	2
1.2 New material policy information to date	2
1.3 Emerging policy issues between May 29 th 2023 and November 29 th 2023	3
2 KEY POINTS ON THE PREVIOUS NET ZERO STRATEGY AND THE A66 SCHEME	4
3 THE REVISED NET ZERO STRATEGY	5
3.1 Background: the revised Net Zero Strategy (NZS)	5
3.2 Where is the error of 130 million tonnes of CO2 for the road transport baseline reported?	6
3.3 Risk to policy delivery on transport for the revised Net Zero Strategy	7
3.4 Projections on EV uptake	8
<i>Table 1: Electric vehicle uptake assumptions between original NZS and revised NZS (CBDP)</i>	<i>9</i>
<i>Figure 1: Electric vehicle uptake assumptions between original NZS and revised NZS (CBDP) for cars</i>	<i>9</i>
3.5 Estimates of traffic growth	11
3.6 Professor Marsden’s report: Reverse Gear	12
3.7 Climate Change Committee (CCC) 2022 Progress Report	12
<i>Figure 2: CCC assessment of UK transport policies (2022 Progress Report, reproduced)</i>	<i>13</i>
3.8 Green Alliance Net Zero Policy Tracker	14
<i>Figure 3: Green Alliance Net Zero policy tracker, whole economy</i>	<i>15</i>
<i>Figure 4: Green Alliance Net Zero policy tracker, sectorial comparison</i>	<i>15</i>
3.9 Conclusions on revised Net Zero Strategy	16
4 DECISION MAKING FOR THE A66	16
4.1 An example decision under existing NNNPS and unlawful NZS	17
4.2 Considerations that must be before the Secretary of State	18
5 COMMENTS ON REP5-026 AND REP5-030	20
6 FINAL PRINCIPAL AREAS OF DISAGREEMENT SUMMARY STATEMENT [PADSS]	20
7 CUMULATIVE ASSESSMENT OF CARBON EMISSIONS FROM THE SCHEME	20
8 CONCLUSIONS	21
9 APPENDIX A: MARSDEN REPORT, May 16 th 2023	22
10 APPENDIX B: TIMES REPORT ON POTENTIAL NET ZERO STRATEGY LEGAL CHALLENGE – April 23 rd 2023	22

1 INTRODUCTION

1.1 Key dates going forward

1 This examination is held against the rapidly shifting policy and legislative background on the key issue of Climate Change. Key dates going forward are:

- A. Close of examination: May 29th 2023
- B. Examiner’s report to SoS: August 29th 2023
- C. Secretary of State’s decision: November 29th 2023.

1.2 New material policy information to date

- 2 Since the examination opened on November 29th, a major Climate Change policy update has been the publication by the Government of a revised Net Zero Strategy (NZS) – with the overarching title “Powering Up Britain” (PUB), and the Carbon Budget Delivery Plan (CBDP) within it, as notified by me in my holding submissions at Deadline 6 [REP6-037] and Deadline 7 [REP7-198]. These documents comprised nearly 3000 pages and came on March 31st just prior to Deadline 6.
- 3 There were major changes to the transport sector and its emissions trajectories in the revised NZS, and I, here in this document, provide an analysis of the PUB and CBDP and these changes, and how they apply materially to the examination.
- 4 On May 16th 2023, Professor Greg Marsden of the University of Leeds published an analysis¹ called “Reverse Gear” for the Centre for Research into Energy Demand Solutions (CREDS) based at the Oxford University Centre for the Environment. This analysis also investigated the PUB and CBDP, and the latest policy for decarbonisation in transport. The report is provided as Appendix A, and I will provide some initial high-level observations from it which are materially relevant to the examination.
- 5 The Green Alliance published a March 2023 update² to their “Net Zero Policy tracker”. This showed that transport had the largest absolute emissions policy gap in the pre-March 31st NZS – such policy gaps to deliver the NZS transport sector emissions reductions is also materially relevant to the examination.
- 6 I previously stated at [REP2-024] paragraph 133 *“It is far too premature for weight to be given to any claims based on the notion that the NZS, or the TDP, will inevitably succeed in securing the Government’s carbon emissions reduction targets – this applies both to Environmental Statements, and to DCO decisions. Such a proposition is clearly not true or evidenced.”* As far forward signpost to the substance of this submission, the evidence from my

¹ Marsden, G. 2023. Reverse gear: The reality and implications of national transport emission reduction policies. Centre for Research into Energy Demand Solutions. Oxford, UK. ISBN: 978-1-913299-17-0

analysis of the PUB and CBDP, and from Professor Marsden’s paper, the Green Alliance policy tracker all substantially reinforce that statement.

1.3 Emerging policy issues between May 29th 2023 and November 29th 2023

- 7 The Government published a draft revised National Networks National Policy Statement (DNNNPS) on March 14th 2023. This currently under consultation until 6th June 2023. The House of Commons Transport (Select) Committee (TSC) opened an inquiry into the DNNNPS on March 24th 2023, and this can be expected to run well into the period to November 2023. Further it is unlikely that the revised NNNPS will become extant policy before November 29th 2023, so the existing NNNPS is most likely to still be current at the time of the SoS decision. However, the consultation on the DNNNPS and the TSC inquiry may well produce evidence that is relevant to transport decarbonisation policy, and relevant to the determination of the Scheme.
- 8 As previous notified at [REP7-198], the revised Net Zero Strategy (NZS) potentially faces further legal challenge with lawyers acting for Friends of the Earth considering that the revised NZS is potentially a “very high risk” strategy (as reported in the press, see Appendix B³). Whilst it is unlikely that a judgment will be available before Nov 29th on a further Judicial Review against the Government on the NZS, if such a legal challenge proceeds, then the Secretary of State should not ignore the fact that the NZS has been found unlawful once, is now being challenged a second time.
- 9 This extreme uncertainty around the revised NZS has profound implications for any assumption that the NZS is bound to succeed, or that the carbon budgets and targets up to 2037 are secured. Given the risk of delivery to the NZS was a core material issue in the July 2022 High Court judgement, and is also a key feature of the emerging second legal challenge, are further reasons why the security of delivering the NZS, and meeting the carbon budgets which depend upon it, cannot be assumed.
- 10 The Climate Change Committee will publish its annual 2023 Progress Report at the end of June 2023. Last year’s report found that 61% of the required emissions reductions for the 6th carbon budget are not even secured “on paper” yet. This report should be noted by the ExA and the SoS in relation to the A66 scheme.
- 11 I refer again to [REP2-024] paragraph 133, quoted above, the proposition that the NZS or TDP will inevitably succeed is clearly not true, and there is now very substantiated evidence that it simply can not be true, nor a reasonable assumption on which to make a DCO decision.
- 12 I now expand on all of this.

³ This appendix was previously submitted at REP7-198 but is resubmitted here for ease of having the information in one document.

2 KEY POINTS ON THE PREVIOUS NET ZERO STRATEGY AND THE A66 SCHEME

- 13 My original Written Representation (WR – errata version, REP2-024) provided considerable analysis of the relationship and interplay between the NZS and how the significance of the climate change impacts of carbon emissions associated with the scheme may be optimally assessed to produce a robust and trustworthy significance assessment.
- 14 For example, REP2-024, para 10 ‘Evaluating significance of GHGs can be understood at an overarching level as *“is the Scheme consistent with the legal framework of the Climate Change Act 2008, the Net Zero target 2050, the Sixth Carbon Budget, the 2030 68% reduction targets, the 2035 78% reduction target, and the policy framework of the Net Zero Strategy to deliver them?”*’.
- 15 I made the point that this wording is also consistent with “the NPSNN 5.17 comparison” (para 15).
- 16 In section 7 of REP2-024, I provided 3 contextualisations of the carbon emissions of the scheme designed to throw light on the NPSNN 5.17 comparison as framed by REP2-024, para 10 above.
- 17 These contextualisations showed that the impacts of the carbon emissions from the A66 scheme were “Major Adverse” and significant on the IEMA significance methodology (against REP2-024, para 10). Two of these contextualisations were based on the national Net Zero Strategy trajectory as (1) scaled to the traffic model area for the scheme (“Contextualisation 1”) and (2) normalised by BEIS local authority area transport emissions across the three planning authority areas (“Contextualisation 2”).
- 18 The overall conclusion was the scheme was quite clearly not contributing to meeting the NZS and the carbon budgets – rather it was creating additional emissions that could not be contained within the available emission space (ie emissions that can be emitted for the UK to still meet the UK carbon budgets). Therefore REP2-024 determined that the scheme fails NPSNN 5.18 test on the basis of the scale of the climate change impacts from its carbon emissions, or in other words the A66 scheme undermines the possibility of delivering the Net Zero Strategy and the carbon budgets.
- 19 With the revised NZS, and the substantial changes to the transport sector trajectories, this has become much more starkly clear as now explained. In other words, since the revised NZS, approving the A66 scheme would not just undermines the possibility of delivering the NZS, but would be totally at odds with delivering the Net Zero Strategy.

3 THE REVISED NET ZERO STRATEGY

3.1 *Background: the revised Net Zero Strategy (NZS)*

20 The Government laid the NZS before Parliament on 19 October 2021 as a report under section 14 of the Climate Change Act (CCA) 2008. The strategy was intended to fulfil the duty, at section 13 of CCA 2008, to “prepare such proposals and policies” that will enable the carbon budgets under the CCA 2008 to be met. The NZS was subsequently found to be unlawful in July 2022, and the Government were ordered to lay before Parliament a fresh report under section 14 before the end of March 2023. The Government published an array of reports including “Powering Up Britain” (PUB) and the “Carbon Budget Delivery Plan” (CBDP) as the revised NZS by end of March 2023.

21 In relation to securing the NZS, I highlight here what the Court said in the NZS judgment⁴ on delivery risk and policy gap. Holgate J. recorded the NZS’s acknowledgement that the delivery pathways to achieve the 6th Carbon Budget are highly ambitious and face considerable delivery challenges and recorded that achievement was subject to a wide uncertainty range. The judge noted at paragraphs 204 and 211 that in approving the Net Zero Strategy, “one obviously material consideration which the Secretary of State must take into account is risk to the delivery of individual proposals and policies and to the achievement of the carbon budgets and the 2050 net zero target.” In finding the NZS unlawful, the judge described risk to delivery as the critical issue when concluding that the information provided to the Minister when reporting on the NZS was insufficient to enable him to discharge his reporting obligations under section 14 of the Climate Change Act 2008.

22 Below, I will provide evidence on the new PUB and CBDP policy documents, and the relevance of them to how carbon emissions are dealt with for the A66 scheme. As signposting to my more detailed material, I now signpost these headline points (for substantive expansion later in this submission):

- (i) An error of 130 million tonnes of CO₂ for the road transport baseline was reported between the original NZS and the revised documents across the years 2023-2037 (carbon budgets 4CB, 5CB and 6CB).
- (ii) No adequate risk assessment has been done by the Government in the revised NZS of the impact of this error on climate policy delivery. Risk assessment is required in two broad areas:
 - (a) How trustworthy is the revised road transport baseline itself (ie if traffic growth is unconstrained, may further corrections be required to it?); and

⁴ R (Friends of the Earth) v Secretary of State for Business Energy and Industrial Strategy [2022] EWHC 1841 (Admin)

(b) How trustworthy are the policies within the revised NZS for road transport.

3.2 Where is the error of 130 million tonnes of CO2 for the road transport baseline reported?

23 The "Powering Up Britain Technical Annex" (PUBTA) describes adjustments made to the baseline for the transport sector⁵. Baselines are the projected emissions BEFORE any of the NZS policies are accounted for: so they can be considered as "business-as-usual" emissions without an NZS. Para 23, reproduced below, states that the baseline error is an average of 4MtCO₂e/year for each year of 4th carbon budget (2023-2027), 9MtCO₂e/year for each year of 5th carbon budget (2028-2032), and 13 MtCO₂e/year for each year of 6th carbon budget (2033-2037).

23. Together, these adjustments lead to an increase in baseline emissions of 4MtCO₂e/year on average in the 4th Carbon Budget period, 9Mt/year for 5th Carbon Budget, and 13Mt/year in the 6th Carbon Budget period.

24 MtCO₂ is megatonnes of CO₂, or millions of tonnes of CO₂. So for the 15 years, 2023-2037, the error in the original NZS for the transport baseline was 130MtCO₂ ($4*5 + 9*5 + 13*5 = 130$). What is described here is a correction made as result of a massive error/miscalculation in the original NZS, 130 MtCO₂ is equivalent to the total annual emissions of a medium sized country like Nigeria or the Netherlands.

25 What are the causes of the baseline error for road transport? The very large correction to the baseline is attributed in the almost entirely to two factors in road transport - optimistic projections of emission reductions from EV uptake⁶ and underestimates of projected traffic growth⁷.

26 What is the impact on the TDP objectives? The result of the baseline correction means that ambition for reducing emissions in the transport sector in the revised NZS is scaled down. As the emissions reduction trajectories in the NZS and the Transport Decarbonisation Plan (TDP) are essentially the same⁸, the ambition for emission reductions in the TDP are similarly scaled down.

⁵ PUBTA, PDF page12, paras 21-23

⁶ PUBTA, PDF page12, para 21

⁷ PUBTA, PDF page12, para 22

⁸ Figure 21 of the NZS, is a refined version of the Figure 2 of the TDP and comparison of the two demonstrates the policy linkage between the TDP and the NZS, and that the policy trajectory including carbon reductions is the same (the main difference is that TDP graph is 'fuzzier'). Essentially the same indicative delivery pathway for domestic transport has been carried forward from the TDP to the NZS.

27 What is the wider impact to UK Climate targets?

- A. The error in the road transport baseline is solely sufficient to account for the shortfall on emission reductions for the NDC⁹ (the UK Nationally Determined Contribution (NDC) at 2030¹⁰ and the UK commitment under the Paris agreement) reported in the CBDP where it says, "*We have quantified emissions savings to deliver 88 Mt or 92% of the NDC*". The NDC was set before the COP26 at 68% reduction of carbon emissions (against 1990 levels) by 2030. This missing 8% is around 8MtCO₂, where the loss of emissions reductions from the transport baseline error is 9MtCO₂ in 2030.
- B. The 13MtCO₂ average loss in baseline emissions reductions in road transport in the 6th carbon budget (2033-2037) has a direct impact on the remaining policy gap in the revised NZS across all sectors. In discussing this, the CBDP¹¹ says only "*97% of the savings required to meet Carbon Budget 6*" have been identified (ie 3% short). Table 1 on CBDP, page 11 identifies the shortfall as 32 MtCO₂ over the 5 years, or 6MtCO₂ for each year (2033-2037). Again, the error in the transport baseline (13MtCO₂ per year) accounts for all of this shortfall. And indicates that other sectors of the economy are already having to make up for failings in transport sector decarbonisation.

3.3 Risk to policy delivery on transport for the revised Net Zero Strategy

28 Risk to policy delivery in the NZS and TDP come from two sources: risks to the baseline (already hugely corrected, will further corrections to it be required?) and risks to the delivery of the policies themselves. These risks are crucially important to considering how to deal with carbon emissions for the A66 scheme. If achieving the revised NZS is risky, then additional emissions being created by the A66 are just not possible without materially further jeopardising the NZS delivery.

29 On the policies themselves, Table 4 of CBDP¹² gives policies captured in the Energy and Emissions Projections (EEP). This has 7¹³ policies relating to Domestic Transport. Table 5 of CBDP¹⁴ gives quantified proposals and policies, with (17) proposals 128¹⁵ to 144¹⁶ for

⁹ CBDP, PDF page 15, para 29 says "*We have quantified emissions savings to deliver 88 Mt or 92% of the NDC. We are confident the delivery of emissions savings by unquantified policies detailed in this package will largely close this gap and the government will bring forward further measures to ensure that the UK will meet its international commitments if required.*"

¹⁰ <https://www.gov.uk/government/publications/the-uks-nationally-determined-contribution-communication-to-the-unfccc>

¹¹ CBDP, PDF Page 15, paras 30-35

¹² Starting on CBDP, PDF page 23

¹³ Policy **1**: Active Travel spending; Policy **8**: Car policies; Policy **28**: Heavy Goods Vehicles (HGV) policies; Policy **31**: Van policies; Policy **35**: Public service vehicles (PSV) policies ; Policy **44**: Renewable Transport Fuel Obligation, (RTFO) - 5% by volume; Policy **45**: Renewable Transport Fuel Obligation, (RTFO) - Increase target to meet RED;

¹⁴ Starting on CBDP, PDF page 45

¹⁵ Starting on CBDP, PDF page 85

¹⁶ Ending on CBDP, PDF page 88

Domestic Transport. Table 6 of CBDP¹⁷ gives quantified proposals and policies, with(14) proposals 20¹⁸ to 33¹⁹ for Domestic Transport. Overall over 35 policies.

30 Policy delivery risk is addressed in CBDP, Appendix D entitled "Appendix D: Sectoral summaries of delivery confidence". Paragraphs 37 to 41²⁰ address "Transport". Overall, the risk assessment is at a very high-level, and not quantified, and the individual policies have not been risk assessed. I submit that the risk assessment is not fit for purpose, and I believe that this will emerge as a key issue in a renewed legal challenge to the NZS (as in Appendix B).

31 However, three broad, high-level risks for the transport sector were identified in CBDP, Appendix D:

- A. Insufficient regulation and incentives to drive the transition to zero emission vehicles at the speed required to enable carbon budgets to be met²¹;
- B. Unanticipated growth in transport demand, going beyond "our high-end projections"²²;
- C. Reliance on nascent or immature technologies and associated markets, such as zero emission vehicle or flight technologies or utilisation of lower carbon fuels²³.

32 I now highlight further concerns on these identified risks, which again have strong implications for how carbon emissions are dealt with for the A66 scheme.

3.4 Projections on EV uptake

33 Percentage figures for the uptake of EVs in the original NZS and in the TDP were obtained under the Environmental Information Regulations (EIR) by Professor Greg Marsden²⁴. Whilst CBDP²⁵ provides more recent data. Table 1 below aggregates the available data²⁶:

¹⁷ Starting on CBDP, PDF page 106

¹⁸ Starting on CBDP, PDF page 115

¹⁹ Ending on CBDP, PDF page 118

²⁰ CBDP, PDF page 180

²¹ CBDP, PDF page 180, para 38

²² CBDP, PDF page 180, para 39

²³ CBDP, PDF page 181, para 40

²⁴ [REDACTED]

²⁵ CBDP, Table 7 under "Appendix C: Deployment assumptions underpinning quantified savings". EV data at PDF Page 171 in Table.

²⁶ Note that the metric in the original NZS is "Proportion of mileage that is ZEV" (Marsden EIR) and is "percentage of fleet" in the CBDP. The DfT have not made clear how much difference this makes – I assume for this document that the proportion of fleet is reflected in mileage to a first approximation, sufficient for the purpose of my analysis.

	2025	2030	2035	2040	2045	2050
Cars (TDP ZEV upper)	9.71%	30.45%	58.58%	81.23%	93.64%	98.41%
Cars (TDP ZEV lower)	11.57%	47.03%	79.09%	92.82%	97.76%	99.46%
Cars (CBDP - ZEV)	7.00%	25.00%	52.00%	?	?	?
Vans (TDP ZEV upper)	3.98%	17.69%	49.50%	75.25%	88.53%	94.26%
Vans (TDP ZEV lower)	4.73%	42.64%	79.17%	92.29%	97.01%	98.58%
Vans(CBDP - ZEV)	3.00%	16.00%	43.00%	?	?	?
HGV (TDP ZEV upper)	0.31%	6.99%	24.92%	49.05%	76.84%	94.58%
HGV (TDP ZEV lower)	0.34%	10.22%	40.05%	76.00%	93.90%	98.25%
HGV (CBDP - ZEV)	0.40%	9.00%	37.00%	?	?	?
Bus/Coach (CBDP - ZEV)	14.00%	35.00%	61.00%	?	?	?

Table 1: Electric vehicle uptake assumptions between original NZS and revised NZS (CBDP)

Figure 1 below plots the data for cars.

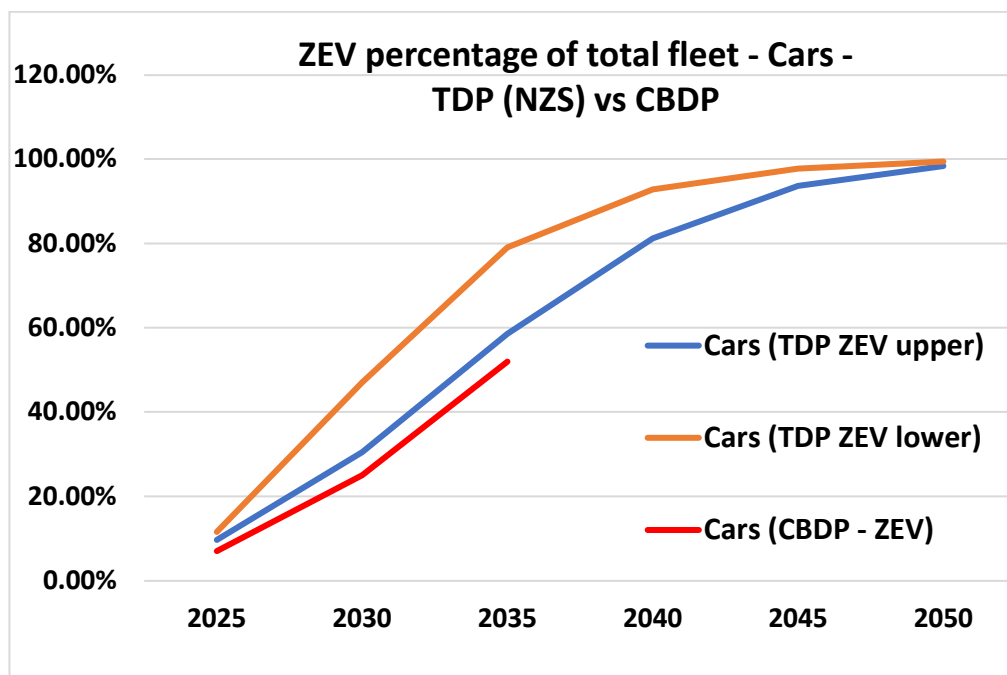


Figure 1: Electric vehicle uptake assumptions between original NZS and revised NZS (CBDP) for cars

34 The graph shows that new baseline trails around 7% below the previous worst case at 2035 (and 27% below the previous best case). Further, it is difficult to see it on the graph, but the CBDP percentage (red) is going up slower than the TDP worst case (blue), as evidenced by the difference/shortfall between the red and blue lines being for 2025: 2.71%, for 2030:5.45%, and for 2035:6.58%. This shows that the projected EV adoption is slower in the new baseline.

35 The situation is similar for vans with the CBDP projection being outside the bounds of the NZS lower and upper projections, and the CBDP rate of EV van adoption being slower than the NZS worst case, the difference/shortfall being for 2025: 0.98%, for 2030:1.69%, and for 2035:6.50%.

36 A further problem is that CBDP is not projecting beyond 2035 whereas the original NZS data projects to 2050.

37 The problem for policy delivery, and critically the risks to policy delivery, with this issue is further shortfalls in EV delivery are not easy to correct and turn around in a couple of years. The slower uptake with the red line (in the now corrected baseline) is locked in. If it, in turn, is not met, then an additional delivery shortfall will also be locked in for carbon emissions from the lifetime of on the non-EV vehicles involved. I submit that numerical risk assessment of such risks is startlingly missing in the CBDP for this issue. The policies being mooted to keep these new trajectories (cars, vans, HGVs etc) for EVs on track, but which have not been individually risk assessed, include:

- ZEV mandate in 2024 and "bolstering charging infrastructure roll-out across the country";
- end date for the sale of new, non-zero emission buses and "expectation" for when the entire fleet should be zero emission;
- Rapid Charging Fund
- Zero Emission Road Freight

38 These policies need to have quantified risks associated with them, and that needs to be seen at the higher level too. Then it would be possible for policy makers to have a clear idea of the impact if the above policies fail to different degrees. For example, at the moment it is not possible to answer a question such as the following because there is no available data: *“What is the impact in MtCO₂ for the 6th Carbon Budget, and also the 7th and 8th Carbon Budgets²⁷ the EV uptake percentage for cars being 45% or 48% (instead of 52%) in 2035?”*

39 Please note that Professor Marsden in the Reverse Gear report (Appendix A) also analyses the rate of electrification. His graphs should not be compared to mine as they are comparing different parameters. For example, where he compares the TDP electrification scenarios it is against the Climate Change Committee projections whereas I compare the NZS/TDP with the revised NZS. He also provides other graphs which are based upon the ZEV Mandate, or the annual targets for new ZEV vehicle sales, whereas I am comparing the percentage ZEVs in total vehicle fleet.

²⁷ Whilst the 7th and 8th carbon budgets are not required to be set until 2026 and 2031 respectively (CCA 2008, section 4(2)(b)), it is useful at this point in time to understand what impacts from failure to delivery policy to 2037 may be “carried forward” into these later budgets, especially when appraising a DCO road scheme over 60 years.

3.5 Estimates of traffic growth

40 CDBP Para 39²⁸ on traffic growth states "*Another risk is that we see considerable, unanticipated growth in transport demand, going beyond our high-end projections*". The CDBP makes no attempt to provide mitigation strategies²⁹ for the potential additional baseline carbon emissions in the road transport sector implied by this statement in the future, nor any quantified risk assessment of it.

41 For example, at the moment, it is not possible to answer a question such as the following because there is no available data: "*if the revised figure for cars is 550 bvk³⁰ in 2030 (the TDP range was 352-547 bvk from the response to Professor Marsden's EIR), what is the effect if this is 600 bvk due to traffic growth exceeding 'our high-end projections'?*".

42 To answer this, new traffic growth figures out to 2050 (for each vehicle type, similar to as provided for the original NZS and TDP in Professor Greg Marsden's EIR response) need to be published by the DfT, with a risk analysis of the effects of different figures.

43 Further, it is not clear if the additional bvk from all the RIS2 and RIS3 projects are expressed in the revised transport sector baseline. For example, how many more bvk would schemes like the A66 scheme add to the baseline? How does that fit in the overall risk assessment of not delivering on the new baseline and policies in the revised NZS?

44 The key thing here to note is that DfT have just had to make an absolutely massive correction for road transport emissions (correcting previous extremely optimistic projections) with the consequence of significantly increasing the risk to the delivery of UK climate targets. Now, the CDBP says that further unanticipated traffic growth may make carbon emissions exceed the high-end projections in the corrected baseline. The Government has provided no evidence that it has assessed the delivery of carbon emissions savings in the revised NZS against this risk.

45 So we have a situation where the transport emissions baseline has just been corrected by around the size of the annual emissions from a medium sized country (eg Nigeria), and yet it may need to be adjusted again, in a couple of years, if transport demand outsteps the latest projections. The growth in traffic and emissions from the Government's road building programme, including the A66 scheme, may be a significant driver contributing to this risk and the potential need for further baseline corrections. However, the ExA, and indeed the Secretary of State, do not have a clear position of this potential impact, nor any risk assessment of it.

²⁸ CDBP, PDF page 180, para 39

²⁹ The CDBP does say "recent lower GDP projections" might lower the projections, but as Government policy is to increase GDP and this is a recent short-term impact, this does not amount to a mitigation strategy, but rather observations on the data provenance.

³⁰ Billion vehicle kilometres per year

3.6 Professor Marsden's report: Reverse Gear

46 I cannot do justice to Professor Marsden's Reverse Gear ("RG") report at this stage, writing a day after its publication. However, I wish to draw attention to some headline points.

47 Under Figure 3, on RG page 10: *"The estimated carbon gap in ambition between the most and least ambitious lines in the TDP was 567 MtC over the period 2023–2037. The CBDP pathway for domestic transport is a cumulative total of around 411 MtC above the most ambitious pathway in the TDP. This corresponds to a closing off of around 72% of the ambitions set out in the TDP, a document produced less than two years previously. The proposed CBDP pathway is around 180 MtC above the Balanced Pathway set out by the CCC in the 6th Carbon Budget."*

48 It should be noted that those 411 million tonnes of CO₂ (cumulative lost emissions reductions over a 15-year period) are, again, a very large footprint. For example, they amount to more than Australia's annual emissions in 2020³¹.

49 RG page 11: *"The level of quantified carbon mitigation from surface transport demand management is, therefore, just over 8 MtC for the period 2023 to 2037 compared with the 211 MtC estimated by the CCC. Demand management seems to have disappeared from the decarbonisation agenda."*

50 RG page 11: *"Transport is the largest emitting sector in the economy. It has been the slowest sector to decarbonise. This reduction in ambition places greater demands on other sectors, each of which has its own delivery challenges."*

3.7 Climate Change Committee (CCC) 2022 Progress Report

51 Note this section has been submitted previously as an Appendix on a previous submission, but I am re-submitting here for full context, and because it is important material on whether the delivery of NZS is secured. On 29th June 2022, the Climate Change Committee (CCC) submitted its "Progress in reducing Emissions - 2022 Report to Parliament" (referred to as CCC_2022_PROG).

52 The report finds that overall "credible plans" exist for only 39% of the required emissions reduction to meet the Sixth Carbon Budget³². This means that **61% of the required emissions reductions for the 6th carbon budget are not even secured "on paper" yet.**

53 CCC_2022_PROG/Figure 3.13 reproduced below shows the relevant data for "credible plans" and other categories for the surface transport sector.

³¹ "Carbon footprint by country" table, at World Population Review website: <https://worldpopulationreview.com/country-rankings/carbon-footprint-by-country>

³² CCC_2022_PROG/page 22

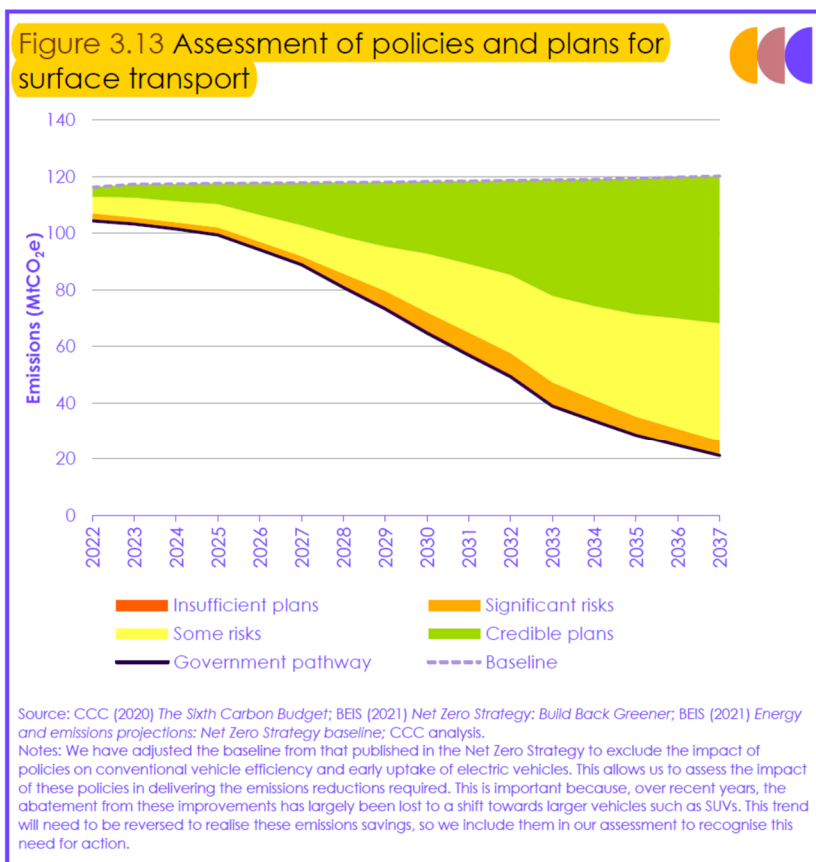


Figure 2: CCC assessment of UK transport policies (2022 Progress Report, reproduced)

54 **Half the emission reductions for surface transport to meet the 6th carbon budget are not secured.** The spreadsheet “Progress in reducing emissions – 2022 Report to Parliament – Charts and data” (referred to as CCC_2022_DATA³³) provides the breakdown of the data behind Figure 3.13 above from the report. Delivery of the “Government pathway” requires a reduction of 99.03 MtCO₂e against the “Baseline” of 120.23 MtCO₂e by 2037. CCC identify credible plans for 51.97 MtCO₂e of this (ie **only 52.5%** of the total). So in the surface transport sector **about half of the required emissions reductions for the 6th carbon budget were not even secured “on paper” at the time of the CCC report**, revealing the true extent of the “delivery gap” in transport decarbonisation policy from the Government’s own advisors on climate change delivery.

55 In identifying barriers to closing the delivery gap, the Progress Report is clear in identifying that there is currently no vision from the Government for traffic reduction, as it states at page 130 “*However, the Government has not yet set out a clear vision of the extent of traffic reduction that is desirable, nor a coherent set of policies to deliver this.*”

³³ Climate Change Committee, “Progress in reducing emissions – 2022 Report to Parliament – Charts and data”, [REDACTED]

56 On page 139, the report identifies that “*the Scottish Government has committed to reducing overall car mileage by 20% by 2030*” and that “*the Welsh Government has also recently committed to reducing the car miles driven per person by 10% by 2030*”. By contrast in England, £24 billion is still allocated for Roads Investment Scheme 2 (RIS2) and “*this still provides considerable funding for new roads **which will induce increased demand***”.

57 In the section “Recommendations to the DfT” (CCC _2022_PROG/page 571), these recommendations are included:

*“Set out, through Active Travel England, guidance for **what actions local authorities should take to realise the Transport Decarbonisation Plan's commitment to half of all journeys in towns and cities being walked or cycled by 2030. This should be accompanied by the required funding.**”*

“Set out measurable targets for the contribution that reducing car travel will play in delivering transport's Net Zero pathway.”

*“Reform the Transport Appraisal Guidance to ensure that it enables practitioners to make decisions that are consistent with the Net Zero pathway. **DfT should consider whether a "vision and validate" approach to the future transport system might be more appropriate than a "predict and provide" one in this context.**”*

58 These are just some of the recommendations which require solid and quantified plans to start to address the identified delivery gap in the surface transport policies in the NZS and the TDP. The recommendations from the Government’s advisors also make clear that policies to reduce traffic and set measurable targets for it do not exist, and that a new approach to road scheme appraisal is urgently needed.

3.8 Green Alliance Net Zero Policy Tracker

59 The Green Alliance published a March 2023 update³⁴ to their “Net Zero Policy tracker”. This is new important material on whether the delivery of NZS is secured. On overall policy in the original NZS, the tracker found that no policy even existed for 13% of the emission reductions required for the whole economy (ie a 13% policy gap) for the 5th carbon budget.

³⁴

Overall progress in this parliament

- The data we have used for our analysis is that made publicly available by the government
- ▣ Across the whole economy, the government has announced policies to cover 87 per cent of all the emissions reductions required during the fifth carbon budget period (2028-32) to meet its net zero strategy targets
- But, only 28 per cent of this is confirmed policy
- This leaves a 13 per cent policy gap



Figure 3: Green Alliance Net Zero policy tracker, whole economy

60 Across all sectors, transport had the largest absolute emissions policy gap (as indicated by crosshatch “no policy” area below, and a 18% gap of “no policy”).

Progress: sectoral overview

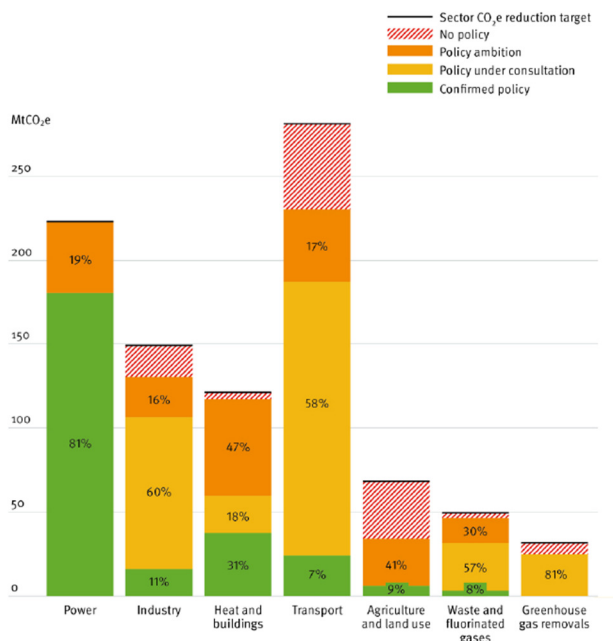


Figure 4: Green Alliance Net Zero policy tracker, sectorial comparison

3.9 Conclusions on revised Net Zero Strategy

61 The previous sections show that any assumption that the delivery of the Net Zero Strategy is secured is a false assumption for many reasons:

- A. A 130 million tonnes of CO₂ error was made in the transport baseline in the original NZS. This loss of emission reductions now has to be made up by other sectors of the economy.
- B. The error alone explained why the Government has had to concede with the revised NZS that the UK has a shortfall on meeting its 2030 NDC under the Paris agreement and has a remaining policy gap for the 6th carbon budget.
- C. There remain significant risks in policy delivery for transport under the revised NZS and these have not been risk assessed in any meaningful way. The revised NZS is subject to further potential legal challenge as a result.
- D. Specifically, there are significantly different assumptions on electric vehicle uptake between the original NZS and the revised NZS, and the risks have not been assessed.
- E. The Government has increased traffic growth projections but still see (unassessed) risks of it “going beyond our high-end projections”.
- F. 411 million tonnes of CO₂ of carbon reductions in the transport sector have been lost between 2023 and 2037 in the CBDP.
- G. The CCC and the Green Alliance both report major lack of security for policy delivery in the NZS.

4 DECISION MAKING FOR THE A66

62 The existing NNNPS provides a premise for decision making that “*any increase in carbon emissions is not a reason to refuse development consent*” whilst providing a “carbon test” that “*unless the increase in carbon emissions resulting from the proposed scheme are so significant that it would have a material impact on the ability of Government to meet its carbon reduction targets*”.

63 The history of DCO decisions under the NNNPS is that the latter exception case (ie that a scheme would have a material impact on the ability of Government to meet its carbon reduction targets) has never been considered to apply. [It is my view that those previous decisions were erroneous to draw that conclusion: however, for the point I am making next, for decisions going forward, it does not matter if I was right or wrong on those previous decisions.]

64 The point is that, for any future decision including on the A66 scheme, there is overwhelming evidence above - from the NZS legal judgement; the revised NZS and the major impacts on NZS delivery from the transport sector within it; from Professor Marsden report; from the CCC and the Green Alliance – that the delivery of the NZS, also meaning delivery of the UK carbon budgets and targets, is not remotely secure.

65 Put bluntly, on the current evidence, it is very likely that the UK will fail to deliver the NZS, and the UK carbon budgets and targets.

66 The impact of this is that any additional emissions from a proposed transport scheme are significant enough to “have a material impact on the ability of Government to meet its carbon reduction targets”. In the situation that it is reasonably likely that the UK will fail to deliver the NZS, any additional emissions make delivery success even less likely, and increase the likelihood of failure.

67 I would like to highlight how the carbon test of the existing NNSPS 5.18 has been used in recent decisions by the Secretary of State in the context of the Net Zero Strategy. I choose for this illustration, the decision letter³⁵ (DL) of the A47 Wansford to Sutton scheme issued on February 17th 2023, as this was well past the date that the NZS had been found to be unlawful and the Government had accepted that (by not appealing the judgement³⁶).

4.1 An example decision under existing NNSPS and unlawful NZS

68 At paragraph 142, the DL states: “*The Secretary of State notes that the Net Zero Strategy has not been quashed and remains government policy. A new report is required to be produced in accordance with the order made by the Court as a result of that successful challenge. As things stand, the Secretary of State has no reason to consider that the Proposed Development will hinder delivery of either the TDP or Net Zero Strategy (whether in its current form or any future updated form).*”

69 At paragraph 143, the DL states: “*Whilst the Proposed Development will result in an increase in carbon emissions, as set out above, Government is legally required to meet the carbon budgets which provide a pathway to net zero and like the ExA, the Secretary of State considers that the Proposed Development is consistent with existing and emerging national policies designed to achieve the UK’s trajectory towards net zero.*”

70 I wish to make these observations:

- A. These extracts show that the Government’s default position is to build any road scheme, irrespective of the carbon emissions associated from the construction and operation of that scheme.

³⁵ <https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/TR010039/TR010039-001210-TR010039-SoS-Decision-Letter-230217.pdf>

³⁶ October 2022

- B. Even at a time when the NZS had been found unlawful on the basis that risk assessment of policy delivery has not been done, the SoS decision still assumed that there was no doubt that the NZS would be successful.
- C. Although the existing NNNPS has a test for significance against the “*material impact on the ability of Government to meet its carbon reduction targets*”, this is masked by an argument which goes along the lines as follows. The Government is legally obliged to meet its net zero targets, and carbon budgets, and therefore somehow, with a large act of faith, the budgets will be met. Therefore any materiality of the significance of emissions can be ignored. **However, my previous sections of evidence show that any assumption that the delivery of the Net Zero Strategy is secured is a false assumption.**
- D. This was true previously, but the recent evidence which I have provided just reinforces the falsehood of attempting to make such a claim.
- E. It also must be clear and evident that having a carbon budget, or an associated Net Zero Strategy, provides no guarantee that that budget or that strategy will be delivered, and this is especially true in the absence of fit of purpose risk assessment of the revised NZS.
- F. Indeed, I have provided evidence above from the NZS legal judgement, the CCC and the Green Alliance, that the policies for delivery of the NZS do not fully exist yet, nor have they been adequately risk assessed. I note the Friends of the Earth assessment of the revised NZS as being a “high risk strategy”.

4.2 Considerations that must be before the Secretary of State

71 I now, respectfully, write as if directly to the SoS although through the ExA and examination process. I respectfully request that the ExA record these points in the Examination Report and requests that the SoS considers them in his/her decision making.

- A. It is clear from the ES, and is not disputed, that A66 scheme creates additional carbon emissions: over 500,000 tonnes of CO₂ from construction, and of the order of 35,000-40,000 additional tonnes of CO₂ annually from 2029 to 2037, critical years for the 5th and 6th carbon budgets.
- B. It is also clear from the evidence above on the revised NZS that there is no evidence that delivery of this critical climate policy under the Climate Change Act 2008 is secured. In fact, the evidence strongly supports the opposite case that the NZS is unlikely to be delivered successfully, and, in any case, the risks to delivery have not been adequately assessed.
- C. At the time of his/her decision, the SoS should consider the latest evidence on the revised NZS, the status of any on-going legal challenge to it, any related reports

from the Transport Select committee (eg on the draft NNNPS), the 2023 CCC Progress Report, any updates to the Green Alliance Net Zero Policy Tracker, Professor Marsden’s research and my submissions here.

- D. I especially highlight my submission above that in the extreme state of uncertainty about delivery of the NZS, any additional emissions from a proposed transport scheme are significant enough to “have a material impact on the ability of Government to meet its carbon reduction targets”.
- E. As the application has an applicable national policy statement (ie the existing NNNPS), section 104 of the Planning Act 2008 (“the 2008 Act”) applies to the decision making. This states that the Secretary of State must decide an application in accordance with the relevant NPSs except to the extent s/he is satisfied that to do so would:
- lead to the UK being in breach of its international obligations (s104(4));
 - be in breach of any statutory duty (s104(5));
 - be unlawful (s104(6));
 - result in adverse impacts from the development outweighing the benefits (s104(7)); or
 - be contrary to regulations about how its decisions are to be taken (s104(8)).
- F. As far as s104(4) is concerned, the scheme adds over 500,000 tonnes CO2 from construction before 2029, and this creates a strong risk that the UK will fail to deliver its 2030 NDC. An 8 MtCO2 shortfall on the NDC has already been noted in the CBDP – the A66 scheme makes the possible shortfall worse by over another 0.5MtCO2. Therefore, the scheme risks the UK being in breach of its international obligations, and the SoS cannot have any legal certainty that approving the scheme will not lead to the UK being in breach of its international obligations.
- G. As far as s104(5) is concerned, the statutory duty to deliver the 5th and 6th carbon budgets depend upon the successful delivery of the NZS. Ample evidence has been provided in this submission that the delivery of the NZS is far from secure, and the risks to delivery have not been adequately assessed. Therefore, the scheme risks, by adding new construction and operation emissions, the UK being in breach of a statutory duty, and the SoS cannot have any legal certainty that approving the scheme will not lead to him/her being in breach of a statutory duty.
- H. As far as s104(6) is concerned, the legal requirement to deliver the 5th and 6th carbon budgets under the Climate Change Act 2008 depend upon the successful delivery of the NZS. Ample evidence has been provided in this submission that the delivery of the NZS is far from secure, and the risks to delivery have not been adequately assessed. Therefore, the approving of the scheme, which adds new construction and operation emissions, risks breaching the law, and the SoS

cannot have any legal certainty that approving the scheme will not be a breach of the law.

5 COMMENTS ON REP5-026 AND REP5-030

72 I maintain my disagreement with the Applicant on the matters in these documents, as reflected in my PADSS document.

73 In some cases, it is regrettable that the Applicant does not have the courage to admit that they are in error where it is plainly the case that they are. This is especially the case for the Applicant's comments on "[REP3-068] Section 4.3: Inclusion of maintenance emissions within the operational emissions reporting" in REP5-030. It is patently clear that the Applicant has "concocted a truly bizarre explanation" [REP3-068/para 35] which results in the Applicant comparing emissions from the year 2044 with one year of the sixth carbon budget 2033-2037 [REP3-068/para 39]. This is simply not a credible comparison to make, not a credible explanation of the original error. It is gobbledygook which appears to be presented solely to try and avoid admitting the original error.

6 FINAL PRINCIPAL AREAS OF DISAGREEMENT SUMMARY STATEMENT [PADSS]

74 I am submitting my final PADSS statement with this submission. I apologise for missing the Deadline D7 and respectfully request that the ExA will accept the PADSS at this date (May 18th).

75 REP5-026 and REP5-030 have no impact on the PADSS statement, previous submitted, as I maintain my disagreements with the Applicant on those matters. Points 1 to 18 of my PADSS are therefore unchanged (apart from minor typographical changes).

76 With this Deadline D8 submission, and the new material provided, I have added new points 19 to 23 to the PADSS. I have made these points in blue coloured text to highlight the new points in the PADSS.

7 CUMULATIVE ASSESSMENT OF CARBON EMISSIONS FROM THE SCHEME

77 I wish to emphasise that my position remains that CATEGORICALLY, there is no assessment of the impact of cumulative carbon emissions in the ES. Points of disagreement relating to this are recorded at PADSS points 1, 2, 5, 8, 9 and the references to my WR therein.

78 The same issue on three other DCO schemes was heard at the High Court by Mrs Justice Thornton in my three Judicial Reviews, R(Boswell) v Sec of State for Transport CO/2837/2022, CO/3506/2022 & CO/4162/2022 on May 10th and 11th 2023 with judgement reserved. The judgement can be expected to fall within the May 29th to November 29th period.

79 The outcome of these cases is an additional issue which the ExA and Secretary of State must consider.

8 CONCLUSIONS

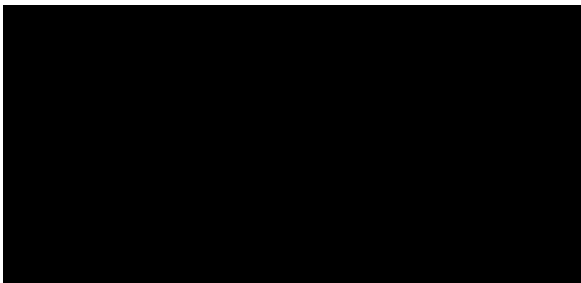
80 The Net Zero Strategy and the UK carbon budgets are not secured. Nor has there been an adequate or lawful risk assessment of the policy delivery of the NZS.

81 In this situation, any additional emissions from new infrastructure, such as the construction and operation emissions of the A66 scheme, have a material impact on the ability of Government to meet its carbon reduction targets which is itself dependent on policy delivery of the NZS.

82 I have provided an analysis of the implications for the decision making on the A66 scheme.

83 I respectfully request that the ExA records the points listed under the section “Considerations that must be before the Secretary of State” in the Examination Report and requests that the SoS considers them in his/her decision making.

84 Specifically, as the NZS is not secured, and the UK carbon budgets and UK NDC are not secured, the Secretary of State must consider if his/her decision would lead to the UK being in breach of its international obligations, to him/her being in breach of a statutory duty, to him/her being in breach of the law under section 104 of the 2008 Act.



Dr Andrew Boswell,
Climate Emergency Policy and Planning, May 18th 2023

9 APPENDIX A: MARSDEN REPORT, May 16th 2023

Marsden, G. 2023. Reverse gear: The reality and implications of national transport emission reduction policies. Centre for Research into Energy Demand Solutions. Oxford, UK. ISBN: 978-1-913299-17-0

<supplied in a separate file>

10 APPENDIX B: TIMES REPORT ON POTENTIAL NET ZERO STRATEGY LEGAL CHALLENGE – April 23rd 2023

ENVIRONMENT

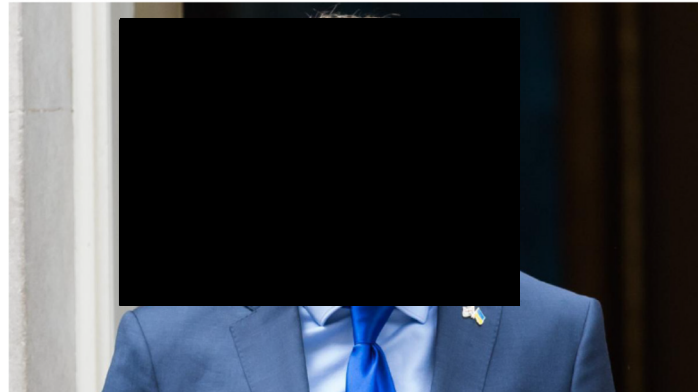
Friends of the Earth threaten legal challenge to new net zero strategy

Shapps's department may be required to revisit climate plan to ward off court battle

NEW

Adam Vaughan,
Environment Editor

Sunday April 23 2023,
9.40pm BST, The Times



Grant Shapps, the energy secretary, could have to go back to the drawing board as climate campaigners highlighted insufficient information on the risk of policies failing to deliver emissions cuts

WIKTOR SZYMANOWICZ/ANADOLU AGENCY/GETTY IMAGES

Ministers may have to rethink their plans for meeting net zero for a second time after green campaigners took the first step towards a legal challenge over inadequate action on climate change.

Grant Shapps, the energy secretary, was forced last month to publish a revised version of the government's flagship [net-zero strategy](#), after the High Court ruled the original was unlawful. The new plan included a mandate to ensure that 28 per cent of car sales were electric by 2025, an extension of grants for heat pumps and a Great British Insulation Scheme.

[Shapps](#) could now have to revisit the plan again. Friends of the Earth, which brought last year's court case along with the Good Law Project and ClientEarth, has given him until this Friday to respond to a pre-action letter. It is the first step towards applying for a judicial review.

The group's focus is the lack of detail on the risk of policies failing to deliver the emissions cuts needed for Britain's legally binding "sixth carbon budget" by 2037, the letter seen by The Times shows.

<https://archive.ph/hZRHT>

1/4

07/05/2023, 21:26

Friends of the Earth threaten legal challenge to new net zero strategy

The only assessment of risk the government has made public is in its carbon budget delivery plan, published last month. That document showed the government only has “high confidence” in policies covering 40 per cent of the [emissions](#) savings required by 2037.

Katie de Kauwe, a lawyer at Friends of the Earth, said that left a huge uncertainty over the levels of confidence that officials have in the remaining 60 per cent.

“If a strategy is very high risk, surely the public should be entitled to know about that. At the moment there is very little information in there. Obviously a pre-action letter is not a commitment to litigate, it is a first and important step. But if the government’s response is inadequate, I can certainly see us taking them to court again,” she said.



A leaked document indicates that 21 of 44 of the net-zero policies, including on tree-planting and peatland restoration, would be difficult to accomplish

ADAM VAUGHAN/EPA

The legal basis for the challenge is whether or not Shapps met the Climate Change Act’s obligations to prepare policies that will ensure carbon targets are met. Friends of the Earth won in the High Court last year over that duty, after a judge ruled the net-zero strategy provided insufficient detail.

If the group’s demands for more detail on risk are not met, a court hearing is likely to take place this year. The idea that some of the policies may be at risk of delivery is not just speculation. A [leaked document](#) by the Department for Environment, Food and Rural Affairs has shown that 21 of 44 of its net zero policies, including on tree planting and peatland restoration, would be hard to achieve.

Last month’s carbon plan also revealed that the government faces a small shortfall for the 2037 carbon target, of 3 per cent of the emissions savings needed.

07/05/2023, 21:26

Friends of the Earth threaten legal challenge to new net zero strategy

Ministers argued the gap would be filled by technology developments. Graham Stuart, the climate minister, said: “Technology does tend to advance. We are obliged under the [Climate Change] Act to give a very high degree of certainty. We have given ourselves a very small headroom. We just know there are new technologies coming through, and it will be irrational to overcommit in areas.”

Shapps’s department is the [subject of a complaint](#) being reviewed by the Information Commissioner’s Office, brought by The Times, over its past failures to disclose the estimated emission savings of individual measures in the net zero strategy, such as insulating more homes. A ruling is expected by the data watchdog imminently.

The government was contacted for comment.

Related articles

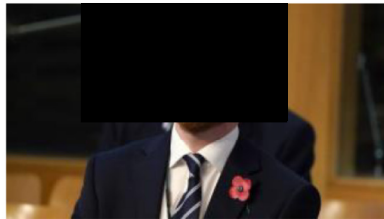


ENVIRONMENT

Ministers were warned net zero schemes won’t work

April 04 2023, 12.01am BST

Ben Spencer

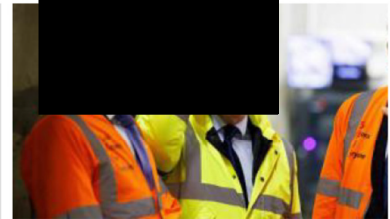


POLITICS

Ministers have no clear plan for net zero, says watchdog

April 20 2023, 12.01am BST

Craig Paton



ENVIRONMENT

Secrecy on net zero data investigated by watchdog

February 09 2023, 12.01am GMT

Adam Vaughan, Environment Editor

Reverse gear: The reality and implications of national transport emission reduction policies

May 2023

Greg Marsden



About this report

Reference

This report should be referenced as:

Marsden, G. 2023. Reverse gear: The reality and implications of national transport emission reduction policies. Centre for Research into Energy Demand Solutions. Oxford, UK. ISBN: 978-1-913299-17-0

Authors:

- **Greg Marsden** | University of Leeds

Contents

Executive summary	4
Glossary	6
1. Blurred lines	7
2. Carbon budgets and the TDP pathways	9
3. Estimating emissions	12
3.1 Model structure	13
3.2 Calibration	14
3.3 Validation	15
3.4 Limitations	16
4. Road traffic levels	18
5. Rate of electrification	21
5.1 Transport decarbonisation plan assumptions	21
5.2 Zero emission mandate	23
6. Scenario analysis of carbon pathways	28
7. Implications and where next?	34
References	37

Executive summary

In 2021 the United Nations Secretary-General issued a 'Code Red' warning for humanity, with the risks of exceeding 1.5 degrees of warming perilously close. That year saw the publication of the Department for Transport's Decarbonisation Plan (TDP) and the UK's Net Zero Strategy as the UK hosted COP26. Transport is the largest emitting sector of greenhouse gas emissions in the UK and for the first time, projected pathways to zero emissions had been produced. The publication of the Transport Decarbonisation Plan and other key strategies such as Bus Back Better, the Williams-Shapps Review and Gear Change spelt an optimistic picture for a more sustainable, equitable and balanced decarbonisation of the transport sector.

In March 2023, just 21 months after the publication of the Transport Decarbonisation Plan, the revision to the whole of government Net Zero Strategy – the Carbon Budget Delivery Plan (CBDP) – was released. It set out a new carbon reduction pathway for transport. Analysis here reveals that 72 percent of the potential ambition set out in the TDP has been lost in the CBDP. As policies to lock down the transition to electric vehicles have been advanced, demand management has largely been abandoned. This is not gear change, this is reverse gear.

Transport has been the laggard sector in carbon reduction for 30 years. It is now the largest emitting sector. The direction set out in the CBDP to go slower is a continuation of the exceptionalism mindset on transport emission reduction. It may be argued that other parts of the economy can go faster and take up the slack. It is the job of the Climate Change Committee (CCC) to assess those arguments from a carbon perspective across the whole economy. It would, though, be surprising if the paring back of ambition was deemed acceptable given the short time that has passed and the seeming lack of commitment to demand management relative to the CCC's view of what was possible. Whatever assessment the CCC reaches, from a transport system perspective, the current strategy makes little sense. Pursuing a technology-led strategy, with no adjustment to prices will increase congestion and widen transport inequalities, missing the opportunity to deliver a fairer transition which drives up well-being and productivity.

This report shows that pathways which achieve the Government's aims on electrification *could* still be consistent with the CCC's Balanced Pathway *if* a 20% reduction in road traffic levels were also to be achieved by 2030 relative to current plans. The policy goal in Scotland is for an absolute reduction in car kilometres of 20% by 2030, although progress against the goal is yet to be substantially realised. Such an outcome cannot be wished for; it needs to be made to come about. In 2021, the Centre for Research into Energy Demand Solutions (CREDS) published a series of scenarios, referred to as Positive Low Energy Futures (PLEF). The PLEF transport report set out alternative pathways which could save energy and carbon but still allow society to flourish (Brand et al., 2021). Pathways with reductions in car mileage will require a step change in funding and delivery of alternatives to car travel which are not currently being planned for. However, every year that passes with a business as usual transport delivery mindset, reduces the potential to shift to such pathways.

Much is being made of the next round of Local Transport Plans (LTPs) as offering additional carbon mitigation through a process of declaring "quantifiable carbon reductions". However, there is no indication that there will be anything more than business as usual funding made available. If that is correct, then most of the savings from the LTPs will have already been factored into the baseline conditions and so will not accelerate the mitigation effort. The policy portfolio, as currently constructed, means that government is planning for traffic growth. The ambitions of the CCC for the 6th Carbon Budget for surface transport are, therefore, off the table.

Local, regional and sub-national bodies have declared climate emergencies and set ambitious transport carbon reduction targets. The level of ambition they thought was in scope when setting their targets has gone. Where next? Two options stand out:

1. The national position is accepted, local targets are re-interpreted as 'aspirations' and the real carbon ambition is pushed back by a few years.
2. Local authorities, businesses and citizens insist on a different approach from national government. Significant transport demand reduction is put back on the agenda which enables the delivery of a fairer and faster transition.

The choices taken in the next couple of years will either open up new opportunities to rethink how society gets around or lock us into a more car-dependent future.

In order to write this report, it has been necessary to force the Department for Transport (DfT) to open up the data surrounding the TDP. Only through transparent accounting and careful scrutiny can the shifts in policy position be understood and communicated. It might be tempting for the DfT to push this report to one side as it does not recognise the numbers in it. If the assumptions held by DfT differ from those presented in the report and the data sheets published alongside it then they should be published. The recent Transport Data Strategy (DfT, 2023) says many of the right things about open data but the principles are not yet routinely put into practice on decarbonisation projections. National and local governments need to be held to account for the actions they propose and the ones they avoid. The atmospheric concentrations of greenhouse gases are only affected by the delivery of policy, not the storylines.

Glossary

CBDP	Carbon Budget Delivery Plan
CCC	Climate Change Committee
DfT	Department for Transport
DESNZ	Department for Energy Security and Net Zero
Domestic Transport	Motorised land based transport, domestic shipping and aviation
EV	Electric Vehicle
HGV	Heavy Goods Vehicle
LTP	Local Transport Plan
NRTP	National Road Traffic Projections
NZS	Net Zero Strategy
6th CB	Sixth Carbon Budget
Surface Transport	Motorised land-based transport (e.g. car, rail, HGV)
TDP	Transport Decarbonisation Plan
ZEV	Zero Emission Vehicle (at tailpipe)

1. Blurred lines

The Department for Transport (DfT) published its Transport Decarbonisation Plan (TDP) in July 2021 (DfT, 2021). The strategy is the transport sector’s contribution to the whole of government net zero challenge. It is a comprehensive document at over 200 pages in length covering all modes and domestic and international emissions. The presence of a strategy is to be welcomed and, given the near thirty-year period over which it spans, it is not to be expected that every policy will be specified.

At the heart of the document is the pathway which the Department for Transport sets for domestic transport emissions from the UK transport sector. This is shown below in Figure 1, based on Figure 2 (p 45) of the report. On it are two ‘fuzzy’ bands which represent the full set of policy pathway outcomes which the DfT anticipated. The blue baseline is the pathways that could be followed in the absence of further policy interventions and the green with ‘policy on’.

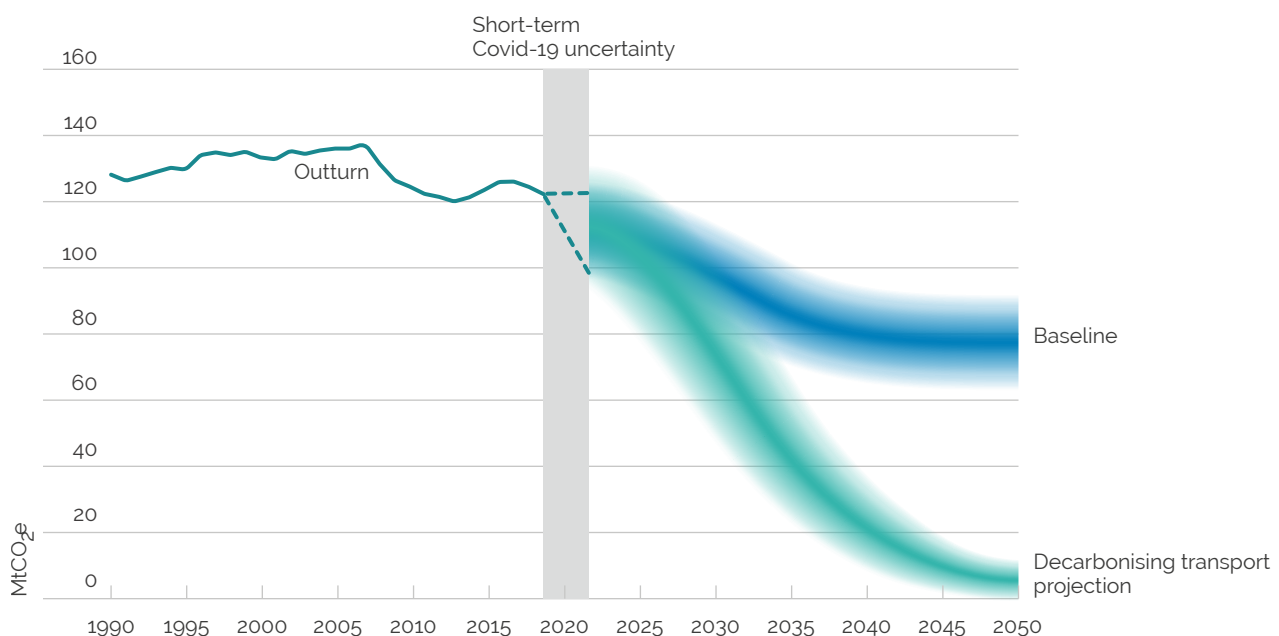


Figure 1: Domestic Transport GHG emission projections from the Transport Decarbonisation Plan (based on Figure 2, page 45 in DfT, 2021)

Whilst the plan contains various estimates of the extent to which different policy initiatives will contribute to carbon reduction, nowhere in the report was it made clear what the assumptions were that framed the boundaries of the pathway projection. How then was the professional community to interpret the strategy? How were local authorities to relate their levels of ambition to those in the plan? How much electrification should be assumed and how much traffic growth (or reduction)? I requested this information from the Department for Transport and was, politely, declined.

In March 2022 I submitted a Freedom of Information request which asked for the DfT to release some of the core assumptions around the plan.¹ These were:

- road traffic levels for cars, LGVs and HGVs;
- the proportion of vehicle miles that were assumed to be driven in zero emission modes (electric or green hydrogen); and
- the assumptions which separate out the higher and lower pathways resulting from the Covid-19 uncertainty.

This was declined on the grounds that the DfT needed a 'safe space' to discuss policies and that the data might be commercially important. I appealed their decision and, for anyone new to the process like I was, found that this appeal was overseen by the DfT. They upheld their original decision. I was then able to further appeal to the Information Commissioner who ruled in my favour noting that:

"The Commissioner considers that there is a very strong public interest in publication of data that will assist the public in understanding policy decisions – especially those designed to be as far-reaching and long-lasting as the transport decarbonisation strategy. Disclosure will help the public to understand where the Government's proposals are too ambitious, not ambitious enough or about right." (ICO, 2022: 3)

The DfT subsequently indicated it would challenge the Information Commissioner's decision before releasing the information on 12th January 2023 (DfT, 2023a).

This report makes use of the data released and other data subsequently placed in the public domain by the DfT. It is deeply regrettable that it took 10 months for this data to be rightfully placed in the public domain and, indeed, that it was not published in July 2021. Decarbonising transport, as this report shows, is not easy. There will be difficult and potentially unpopular choices ahead. We can only hope to make progress with such decisions if everyone understands the magnitude of the challenge we face. Transparency is central to this. Looking ahead, I hope that this marks a new dawn in open carbon accounting across the sector. I also hope that this report, and the very significant implications of its findings for future carbon policy in the sector, change the debate from one of sugar-coated optimism to one of hard edged realism.

¹ Full details of my request and the responses can be found on [What do they know, 2023](#).

2. Carbon budgets and the TDP pathways

The indicative share of the carbon budget which domestic transport is working towards has been revised twice since the TDP. This marks a significant reduction in the expectations from the sector: 72% of the potential ambition set out in the TDP is now not anticipated to be either feasible or necessary in the Carbon Budget Delivery Plan (DESNZ, 2023).

Figure 2 shows the ambition space of the TDP policy pathway edge cases compared to the Climate Change Committee's Balanced Pathway. Also included are the trajectories for domestic transport shown in the Net Zero Strategy (NZS) of October 2021. This suggests that the widest range of outcomes set out in the TDP in July 2021 were never really considered likely to be realised. In reality, only pathways which are trending towards the more ambitious pathway for the NZS would be consistent with the expectations set out by the CCC in the 6th Carbon Budget.

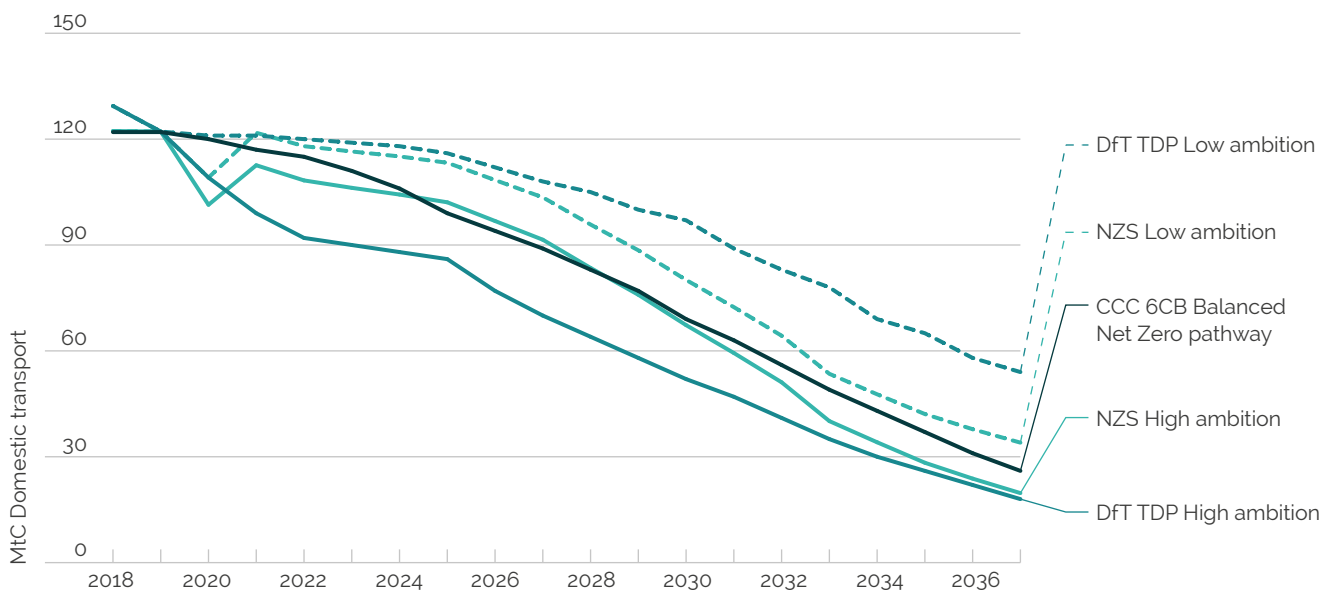


Figure 2: Indicative Carbon Pathways set out in TDP, 6th Carbon Budget and Net Zero Strategy for domestic transport²

2 All of the source data and its provenance can be found in the [data book for the report](#). The 'low ambition' lines correspond to the upper edge of a set of pathways, with the 'high ambition' corresponding to the lower edge.

The Carbon Budget Delivery Plan produced in March 2023 has set out new indicative pathways for each sector. Instead of a range of outcomes in the NZS, single estimates were provided for each budget period which have had to be interpolated. The CBDP budget is superimposed onto the lines from Figure 2 as shown in Figure 3.

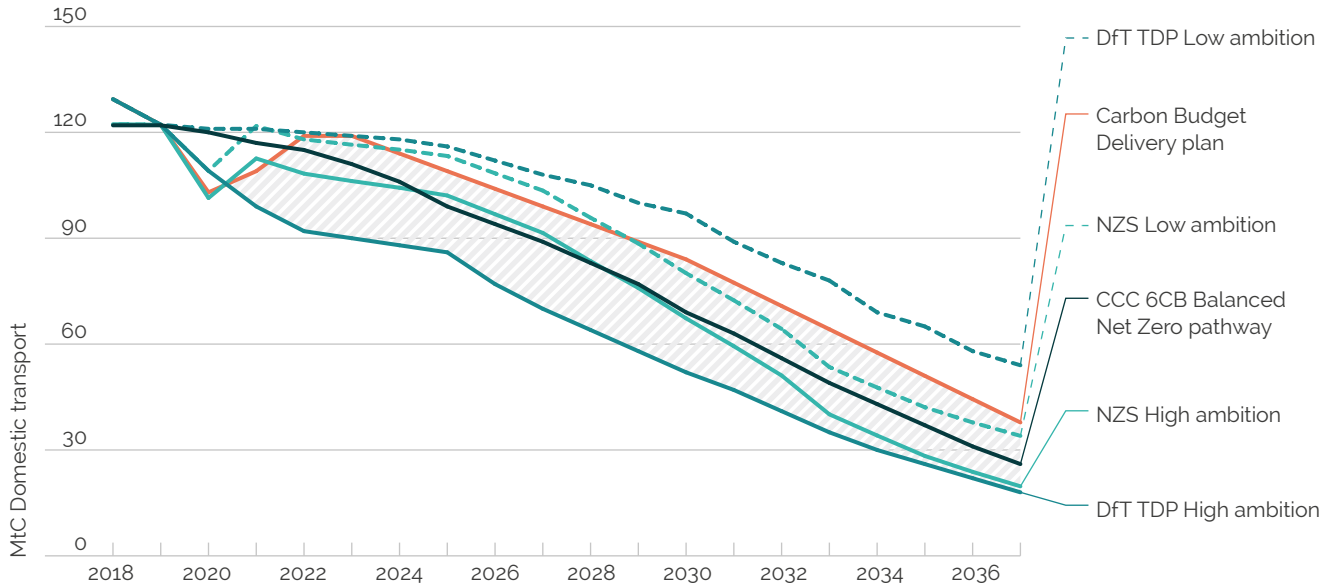


Figure 3: Anticipated carbon pathway from domestic transport in Carbon Budget Delivery Plan and previous pathways

The estimated carbon gap in ambition between the most and least ambitious lines in the TDP was 567 MtC over the period 2023–2037. The CBDP pathway for domestic transport is a cumulative total of around 411 MtC above the most ambitious pathway in the TDP. This corresponds to a closing off of around 72% of the ambitions set out in the TDP, a document produced less than two years previously. The proposed CBDP pathway is around 180 MtC above the Balanced Pathway set out by the CCC in the 6th Carbon Budget.

The CBDP contains a set of quantified and yet to be quantified estimates of carbon savings from different measures across the whole economy (Table 5 in the CBDP). For surface transport, there are just two measures which correspond to influencing travel demand. The first is enhanced investment in walking and cycling, which is estimated to achieve 0.045 MtC additional mitigation compared to the baseline in 2023–2027, rising to 0.2 MtC in 2033–2037. Increased vehicle occupancy is also included but is not anticipated to provide any savings until 2027 at the earliest, rising to 0.7 MtC during by 2033–2037.

Table 6 in the CBDP also provides some further, as yet unquantified policies, which could contribute to mitigation efforts. These include the quantified carbon reductions which will be declared in the Local Transport Plan process, the publication of the Future of Rural Transport strategy and the launch of the Commute Zero initiative.

The level of quantified carbon mitigation from surface transport demand management is, therefore, just over 8 MtC for the period 2023 to 2037 compared with the 211 MtC estimated by the CCC. Demand management seems to have disappeared from the decarbonisation agenda. Whilst it might be argued that the next round of Local Transport Plans (LTPs) could fill the gap, this has not been estimated (in contrast to a whole raft of technological interventions). Local authority action is important but there needs to be clarity on the extent to which any funding committed will bring additional mitigation. Business as usual funding allocations are already built into the baseline progress. There is no clarity about what extra resource will be made available for the Plans or indeed, that the resources provided will even provide a continuation of spending power in real terms given current inflationary pressures. Public transport also continues to see lower demand than in the pre-pandemic period, particularly Monday to Friday (DfT, 2023b). Unless there is a step change in funding and the adoption of more ambitious plans, then it seems unlikely that the LTP process will contribute significantly to the overall national mitigation effort beyond the baseline. This is not just an issue which is defined by national government. However, any switch away from the private car cannot simply be desired, it has to be brought about. That would require a very different set of policies and funding commitments than is in play today.

Transport is the largest emitting sector in the economy. It has been the slowest sector to decarbonise. This reduction in ambition places greater demands on other sectors, each of which has its own delivery challenges. It could, in theory, be argued that it is economically optimal to pursue a pathway where transport goes slower than other sectors if it is cheaper to save carbon elsewhere in the economy. As the analysis in this document will show however, there is nothing economically optimal about the pathway being adopted within transport. It will also create substantial social injustice along the way given the marginalisation of travel demand policies relative to technology. The next sections unpack these issues further.

3. Estimating emissions

There are lots of numbers produced by lots of government departments spread across multiple documents. The task of reading across them and filling the gaps of 'what is not said' is a challenge which makes scrutiny very difficult. The basis for the analysis which follows is set out below for transparency.

For the remainder of this report, the analysis focuses on surface transport emissions. The contribution of domestic aviation and domestic shipping are removed from the analysis as the interventions to tackle these are largely distinct to those which address surface transport.

The analysis in this report have had to be developed through a reverse engineered model (Carbon Scenario Estimator – CaSE) to enable an approximation of the DfT's carbon estimations. The model is a simple spreadsheet tool which produces estimates of the total national CO₂ emissions from the three main components which define carbon from surface transport:

- traffic levels by cars, vans and HGVs
- the proportion of those miles driven in zero emission mode
- the efficiency of the fossil fuel vehicles which drive the remaining miles

The model is calibrated through adjustments to the vehicle efficiency of the remaining fossil fuel fleet.

No emissions from electricity generation are taken account of, nor upstream emissions in the construction of vehicles in line with the DfT's accounting procedures, not because these should be ignored.³

³ See Figure 3 in DfT, 2023c which suggests a whole life saving of 75% emissions for a battery electric vehicle over a petrol engine car.

3.1 Model structure

The model structure is shown below. A series of inputs are required to develop a scenario to be tested. These points where scenarios can be varied are marked with an arrow. Inputs are required for each year, specified out to 2037 which corresponds with the end of the 6th Carbon Budget.

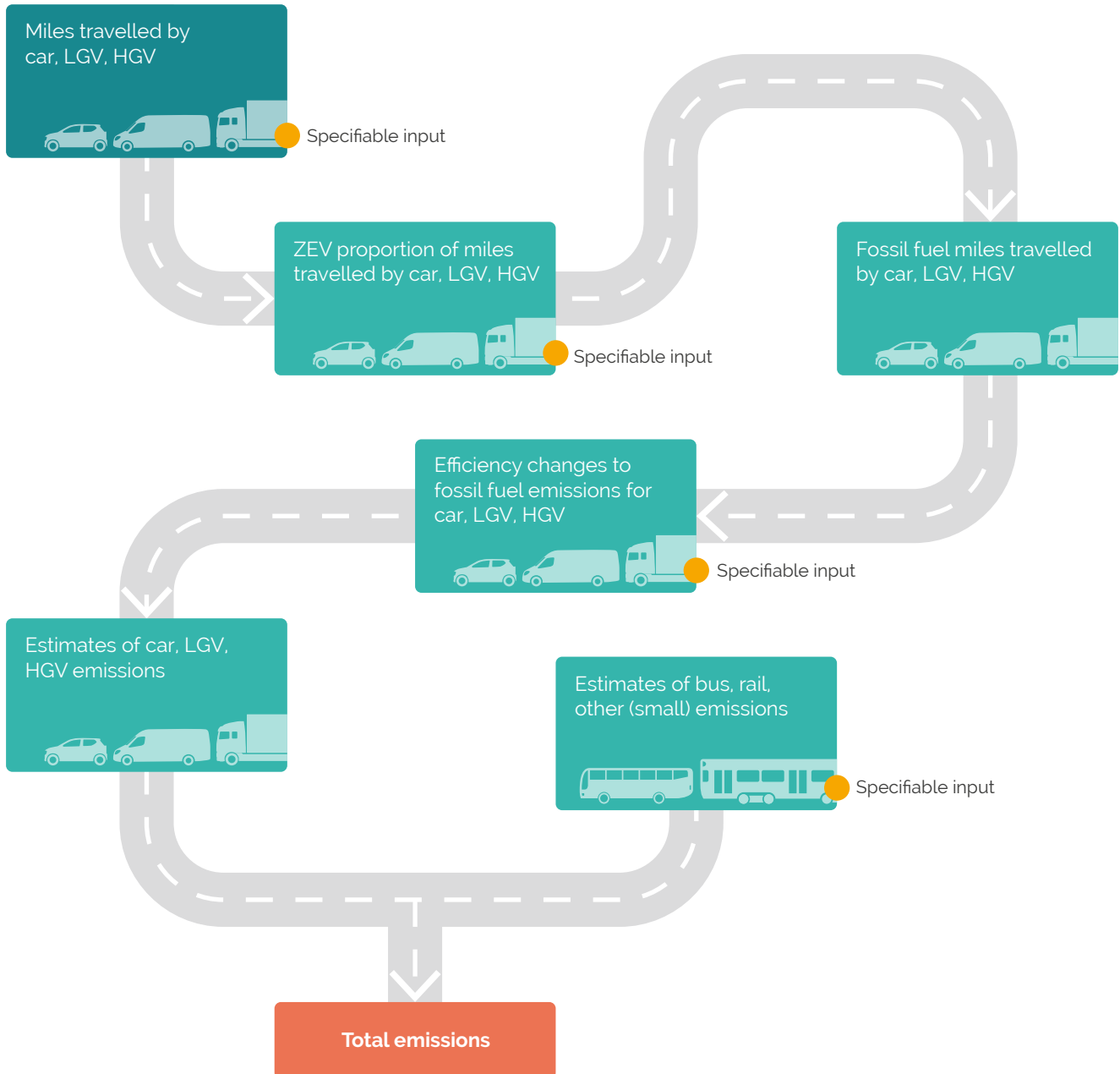


Figure 4: Carbon emissions model estimator

3.2 Calibration

The model was calibrated using data published from the National Road Traffic Projections Core Scenario (DfT, 2022).

Electric vehicle (EV) uptake figures were based on the Transport Appraisal Guidance (TAG) November 2022 update (Unit 3.5.6, A1.3). An initial set of vehicle efficiency estimates were used which had been developed through a combination of examining TAG assumptions (Unit 3.3.5, A.3) and narrative and projected outcomes on efficiency mitigation from the CCC in the 6th Carbon Budget. The assumptions can be found in data sheet 1 of the accompanying spreadsheet.

Result	2025	2030	2035
CaSE (MtC)	87.5	74.6	60.6
NRTP (MtC)	84.9	71.6	58.6
Difference (MtC)	2.6	3.0	2.0
% Difference	+3.1%	+4.1%	+3.4%

This suggests that the CaSE model had used slightly less ambitious assumptions on vehicle efficiency gains for non EVs than in the DfT projections.

As the assumptions for cars had been set to be slightly less aggressive than the CCC, these were adjusted. As more of the fleet switches to electric over time, then adjustments to efficiency need to feature early in the period to close the gap. Therefore, it was assumed that, by 2025 a 5% increase in efficiency relative to the initial case was assumed, growing to 7% by 2030 and then flatlining (reflecting no further investment in those technologies by manufacturers).

Result	2025	2030	2035
CaSE (MtC)	84.7	71.5	58.2
NRTP (MtC)	84.9	71.6	58.6
Difference (MtC)	-0.2	-0.1	-0.4
% Difference	-0.2%	-0.1%	-0.6%

The difference between the CaSE and NRTP were all within 1%, with CaSE marginally underestimating emissions. This was deemed to be a satisfactory calibration. The vehicle efficiency assumptions applied for cars, vans and HGVs over time are shown in Figure 5 and in data sheet 2 of the accompanying spreadsheet.

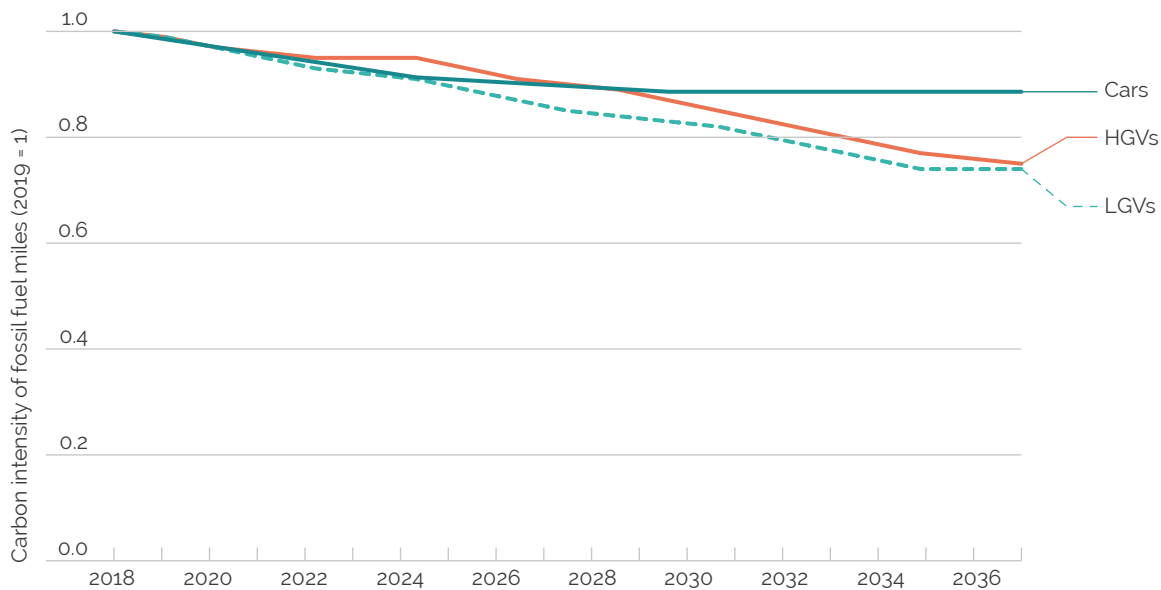


Figure 5: Average vehicle efficiency assumptions for non EV fleet (Source: Author's work)

3.3 Validation

The calibrated model was then tested against two other scenarios from the National Road Traffic Projections (NRTP) as a validation exercise. These were the High Economy Scenario (Table 3) and the Regional Scenario (Table 4). The efficiency data was held constant as was the EV uptake (in line with the scenario descriptors) and the only variation was the road traffic levels

Result	2025	2030	2035
CaSE (MtC)	86.7	74.0	62.0
NRTP (MtC)	86.2	74.1	62.1
Difference (MtC)	+0.5	-0.1	-0.1
% Difference	+0.6%	-0.1%	-0.2%

Result	2025	2030	2035
CaSE (MtC)	84.8	71.5	58.3
NRTP (MtC)	84.9	71.6	58.7
Difference (MtC)	-0.1	-0.1	-0.4
% Difference	-0.1%	-0.1%	-0.6%

As the validation falls within $\pm 1\%$ across the two validation scenarios for all years assessed, it is assumed that CaSE reproduces the CO₂ emissions in line with the National Transport Model approach and can therefore be used to provide indicative estimates of vehicle emissions from alternative scenario combinations.

It is important to note that the calibration and validation was undertaken using data from the NRTP which is for England and Wales only, whereas the surface transport elements of the TDP released under the FOI request are for the whole of the UK. For the purposes of like for like comparison for the remainder of the report therefore, it was necessary to estimate whole UK traffic levels and to project these across different scenario years. Data from Scotland was taken from TRA0106 (DfT, 2022b) and for Northern Ireland from Infrastructure Northern Ireland.⁴ The growth rates for Scotland and Northern Ireland were assumed to follow those in the NRTP or as set by the CCC. Traffic levels in Northern Ireland and Scotland formed less than 4% and 9% of the UK total respectively in 2020 and so, whilst this assumption is sub-optimal, any variations are likely to have only a limited impact on the outcomes of the carbon estimator. Over-estimating traffic levels in Scotland by 10% for example would mean around an additional 1% of miles had been included. The estimates of traffic levels for all of the NRTP scenarios, scaled up to UK, are included in the accompanying spreadsheet.

3.4 Limitations

The aim of the CaSE model is to provide a quick strategic read out of the implications of different levels of ambition on traffic growth, electrification or vehicle efficiency. The model does not, however, have any feedbacks in it. So, for example, if there is a scenario with high electrification there is no feedback to lower motoring costs which would potentially add traffic growth. However, where possible, scenarios which already included such assumptions (e.g. NRTP) were used.

The model also does not contain a detailed stock model of vehicle turnover.⁵ So, estimates of total average fleet efficiency which are used, fold together assumptions about the efficiency of new non zero emission cars, changes in biofuel blends and different scrappage rates which might occur. Plug-in hybrids are treated in two separate ways. Where figures are provided (e.g. in the Freedom of Information request) some of their miles are treated as being driven in electric mode (zero emissions) whilst the remainder count to the fossil fuelled fleet. When they are not provided, estimates can be made to try and replicate the description above or more ambitious improvements to new car efficiency can be assumed. A recent report by the RAC Foundation explores these different issues in more detail (Wengraf and Lam, 2023).

4 Inferred from Department for Infrastructure, 2014 – where 2014 levels taken to be 2022 and then adjusted according to changes applied to England, Wales and Scotland

5 Indeed, the sales of new vehicles, fleet size and turnover rates used in national scenarios are, as yet unclear and a clear stock model would be a useful aid to further transparency

Of course, more model refinement would be desirable. However, the calibration suggests that, as an aggregate tool, it performs well. The model is able to be quickly updated. If numbers are challenged or new numbers come to light as evidence emerges then these can be amended. The key focus here has been transparency. Whilst the information in the NRTP and the publication of the Common Analytical Scenarios is an important step forward, it is still not standard practice to publish the assumptions on road traffic and technology uptake when Government puts forwards its claims for decarbonisation. The Carbon Budget Delivery Plan, for example, does not clearly set out what assumptions have been used for surface transport.

4. Road traffic levels

The Transport Decarbonisation Plan contained the two edge case road traffic projections which, in July 2021, the DfT suggested framed the carbon ambition within the plan (Figure 6).

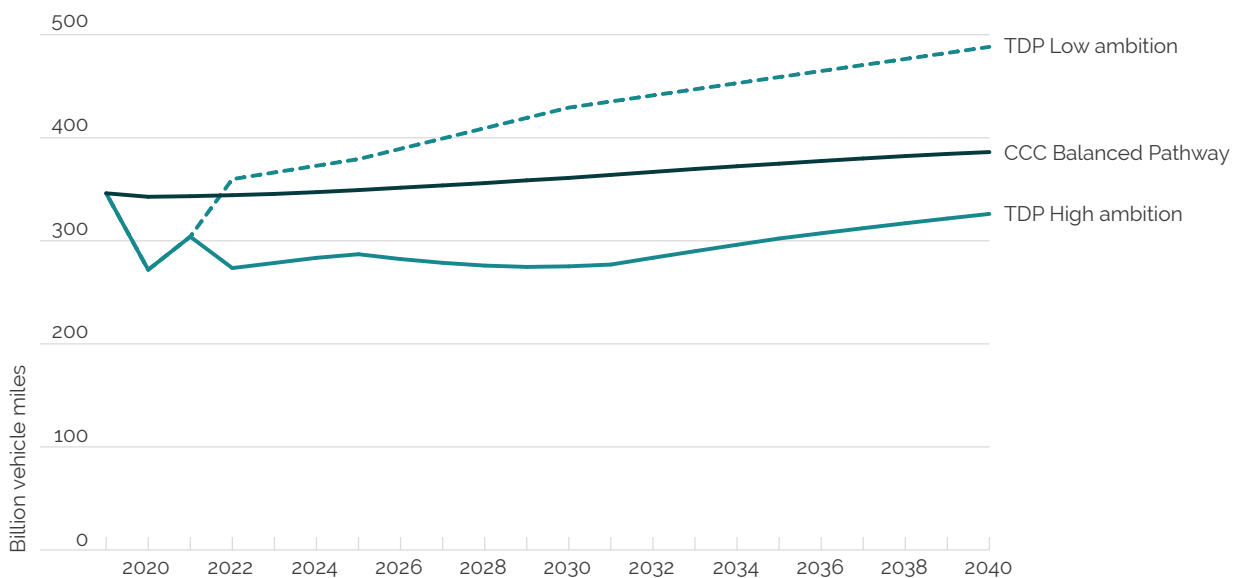


Figure 6: Transport Decarbonisation Plan edge road traffic scenarios

In the TDP high ambition scenario for carbon reductions, road traffic reductions seen during the pandemic are substantially maintained to the degree that even by 2040 road traffic levels are 20bn vehicle miles per year lower than in 2019. This scenario is also assumed to have low GDP and high fuel prices.

By contrast, the low ambition TDP scenario assumes a very different technological future with medium economic growth. Connected autonomous vehicles are more prevalent and people are deemed less likely to share them. Overall road traffic is, by 2040, 142bn vehicle miles higher than 2019.

The black line on the chart represents the assumptions by the CCC in the Balanced Pathway of the 6th carbon budget. This scenario pre-dates the pandemic and assumed that, by 2040, road traffic would be 40 billion vehicle miles per year greater than in 2019.

The analysis shows two important things:

1. The within-year gap between the upper and lower traffic scenarios is so large that almost any imaginable traffic future would fall between the two.
2. The difference between the scenarios is huge in terms of vehicle miles driven. The TDP high ambition scenario has a cumulative mileage of 4.3 trillion vehicle miles over the period 2023–2037. The equivalent for the CCC was 5.4 trillion vehicle miles and, for the TDP low ambition scenario, 6.3 trillion vehicle miles (47% more than the high ambition scenario).

In December 2022, the DfT published its regular update to the National Road Traffic Projections. A range of scenarios were presented as shown in Figure 7, again scaled up to the whole of the UK.

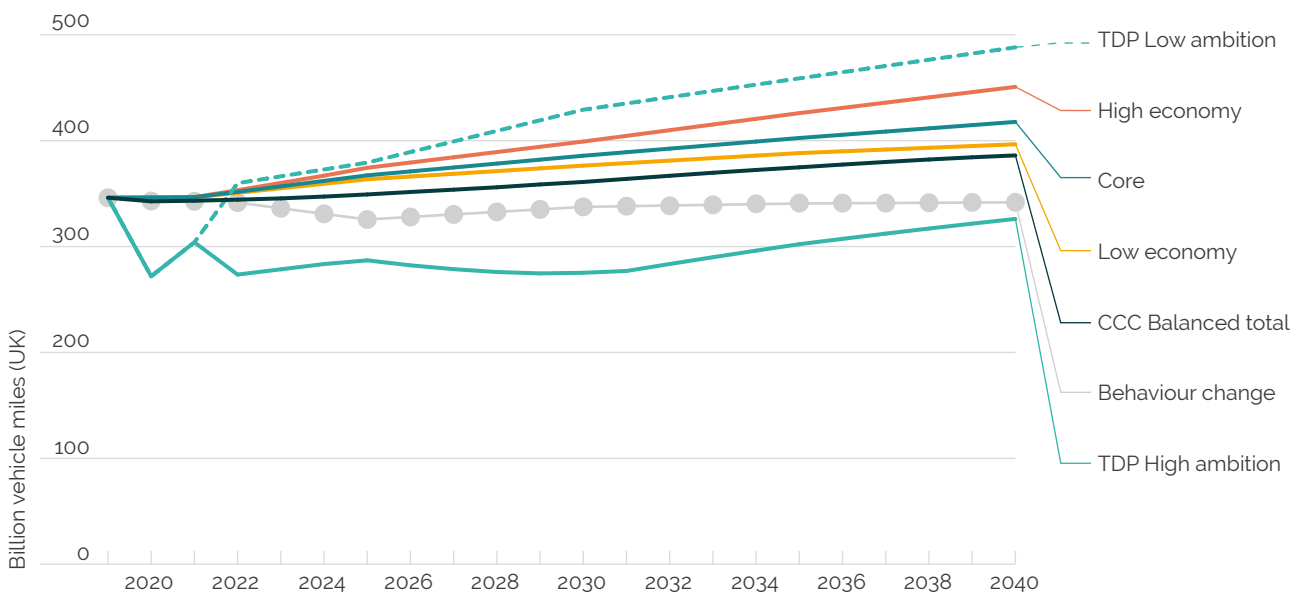


Figure 7: National Road Traffic Projections, TDP and CCC traffic scenarios (Source: Author's analysis of NRTP scaled up)

There is only one scenario which represents a future with no traffic growth, referred to as the behaviour change scenario. This includes major post-pandemic travel behaviour adaptations and accelerations of previous trends such as the shift away from taking up car licenses amongst younger people. The trips made per head of population reduce by 39% for the commute and up to 55% for visiting friends and family by 2040 (DfT, 2022). This scenario seems very unlikely to emerge without any supporting policies to make it happen.

Current traffic levels are already significantly above the levels anticipated in the behaviour change scenario projection which, coupled with the DfT's own assessment that Covid-19 is likely to be a one-off adjustment to travel behaviour (a 5% reduction in car traffic), suggests that this scenario is only for sensitivity testing plans against, rather than something the DfT is currently basing its policy planning around. Indeed, the Draft National Policy Statement for National Networks states that "continued absolute traffic growth is likely under all scenarios" (DfT, 2023b, p21).

Less than 18 months on from the publication of the Transport Decarbonisation Plan much of the potential ambition on travel demand reduction has been set aside. The core scenario and the variants around it fall above the CCC's 6th carbon budget pathway. It should be noted that the DfT identifies these scenarios as 'policy off' and, therefore, actions could be taken which would impact on the projected road traffic levels. However, as the analysis of the March 2023 CBDP in Section 2 showed, no such policies are currently anticipated out to 2037. The Draft National Policy Statement states that as absolute traffic growth is likely "enhancements on the national road network will be necessary" (DfT, 2023b, p21). It is therefore the case that the government is planning for traffic outcomes which are consistent with the less ambitious half of the TDP.

5. Rate of electrification

The rate at which the fleet of cars, vans and HGVs transition to electric or other equivalent zero tailpipe emission technology makes a significant difference to total carbon emissions. Very aggressive technology uptake curves imply that more of the fleet is zero emission early in the carbon budget periods and, therefore, the impacts of traffic levels are relatively less important than when uptake is slow.

5.1 Transport decarbonisation plan assumptions

Figures 8, 9 and 10 below show the ambitions set out in the FOI response for the more and less ambitious edges of the decarbonisation plan, with the CCC line shown in black for cars, vans and HGVs respectively.

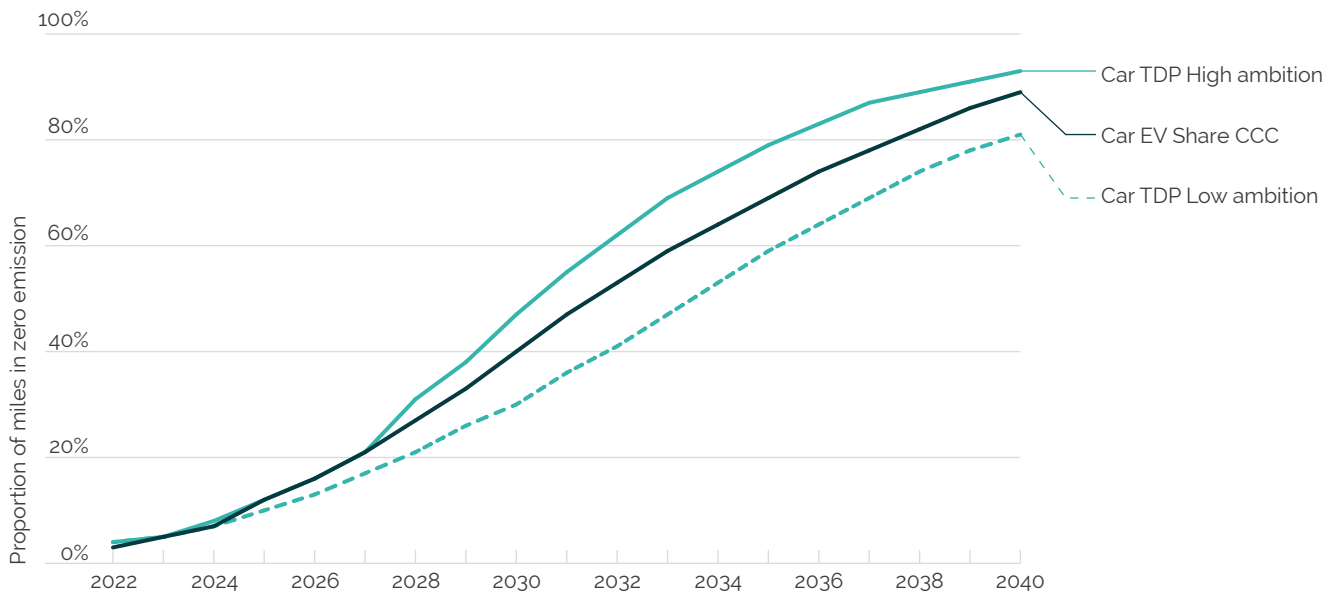


Figure 8: Percentage of miles anticipated to be driven in zero emission – cars

The uptake pathways, as with the traffic demand pathways, contain substantial variation between the upper and lower bounds. For example, by 2033, in the more ambitious TDP scenario 74% of car miles are electric whereas in the less ambitious scenario this is 47%. Similarly, for vans these figures are 69% and 35% respectively, reflecting the very steep uptake curve on Figure 9. The HGV transition is expected to start later but there is also significant divergence across the scenarios with a difference of 25% in uptake by 2040.

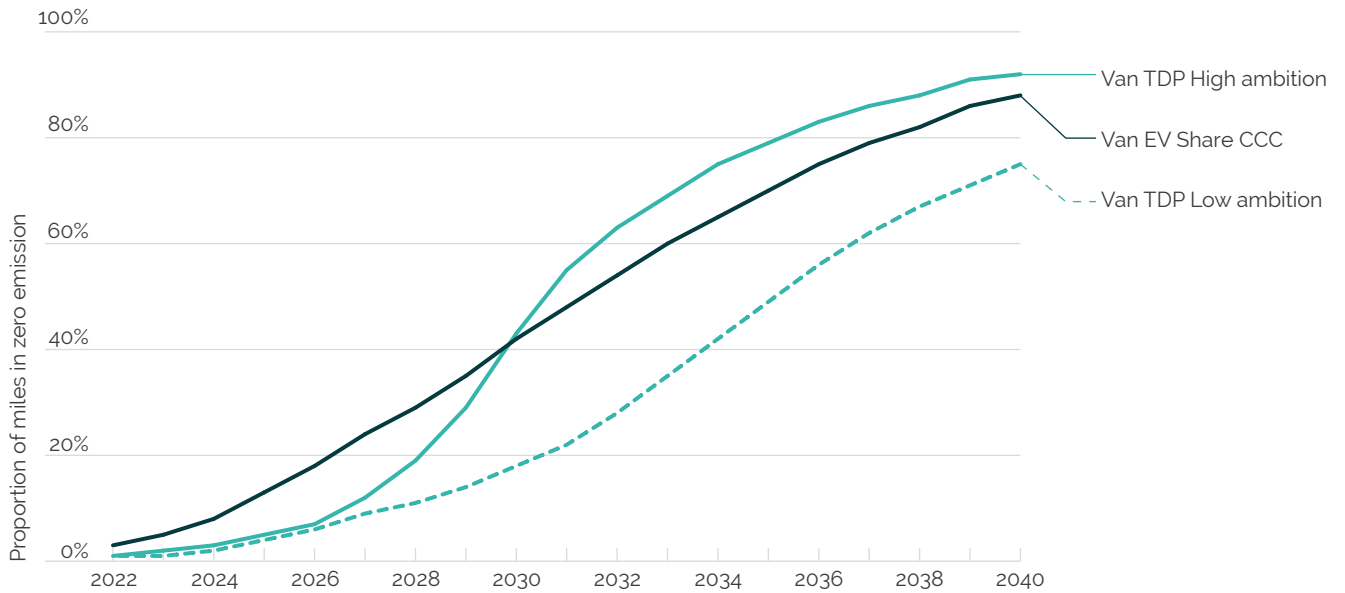


Figure 9: Percentage of miles anticipated to be driven in zero emission – vans

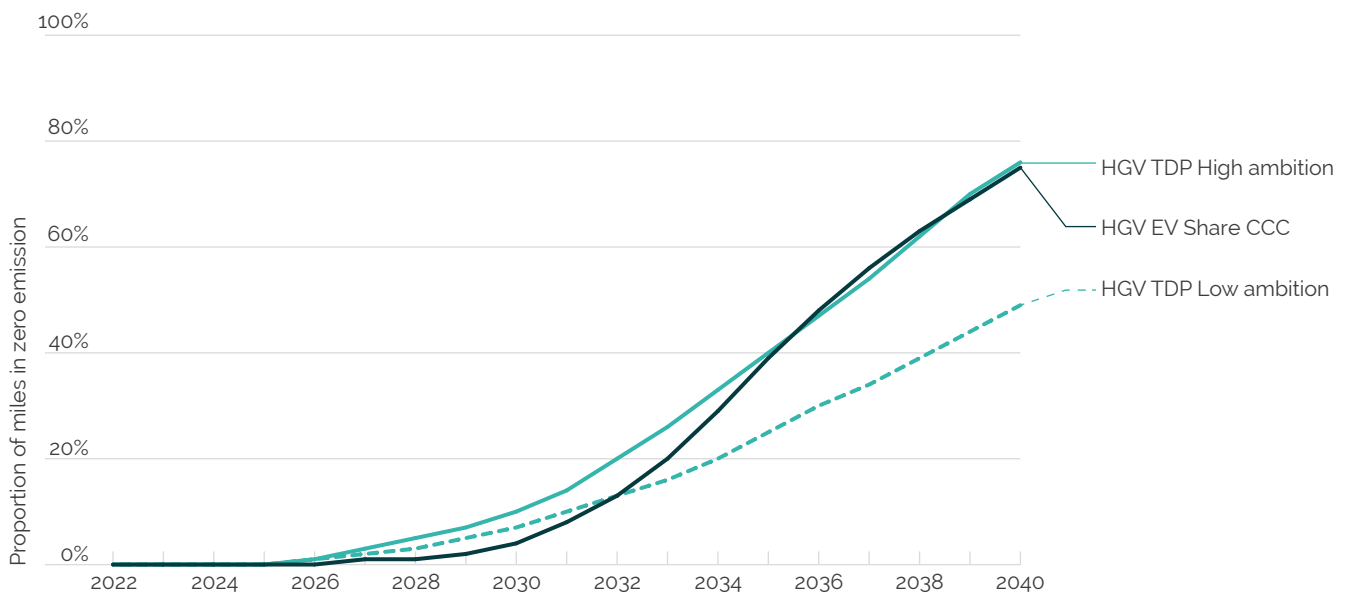


Figure 10: Percentage of miles anticipated to be driven in zero emission – HGVs

5.2 Zero emission mandate

In March 2023, the final consultation on the implementation of the Zero Emission Mandate was released (DfT, 2023). The Zero Emission Mandate sets out how the UK will, if adopted, transition from the current new car CO₂ emission standards to phasing out the sale of entirely fossil fuel engine cars and vans by 2030 and Plug-In Hybrids by 2035. The mandate will be introduced in 2024.

The Mandate essentially sets out the pathway for the introduction of new cars into the fleet. Assumptions about the total size of the fleet, the volume of new vehicle sales and the speed with which fossil fuel vehicles are phased out of the fleet all make a difference to the extent to which new vehicle sales translate to proportions of miles driven in electric vehicles (see Wengraf and Lam, 2023).

The proportions of new car and van sales which should be zero emission, as set out in the consultation, are shown in Table 5. These values are the same as those set out in the first round of consultation and are therefore taken, in this report, to be the likely future policy position.

Table 5: Annual targets of ZEV new vehicle sales from 2024–2035 for cars and vans

Year	Cars	Vans
2024	22%	10%
2025	28%	19%
2026	33%	22%
2027	38%	34%
2028	52%	46%
2029	66%	58%
2030	80%	70%
2031*	84%	76%
2032*	88%	82%
2033*	92%	88%
2034*	96%	94%
2035*	100%	100%

*2031 onwards to be set later

Figures 11 and 12 estimate how these new car and van sales proportions would feed through into the proportions of miles driven in electric vehicles. The fleet penetration rates were calibrated against the values set out in Appendix C of the CBDP for cars and vans. It is assumed that EVs are driven like for like the same mileage as their petrol or diesel equivalents. As newer vehicles are used more intensively than older vehicles, so the percent of miles driven fuelled by electricity exceeds the percent of the fleet which is electric.

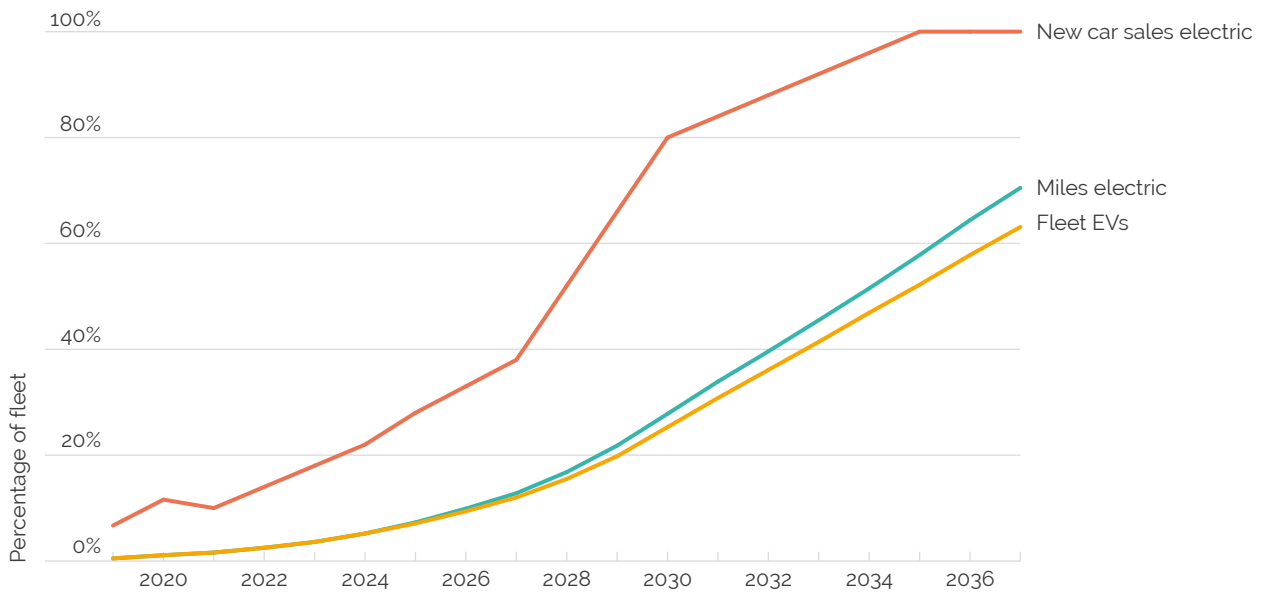


Figure 11: Estimated impacts of ZEV mandate on cars (Source: Author's analysis)

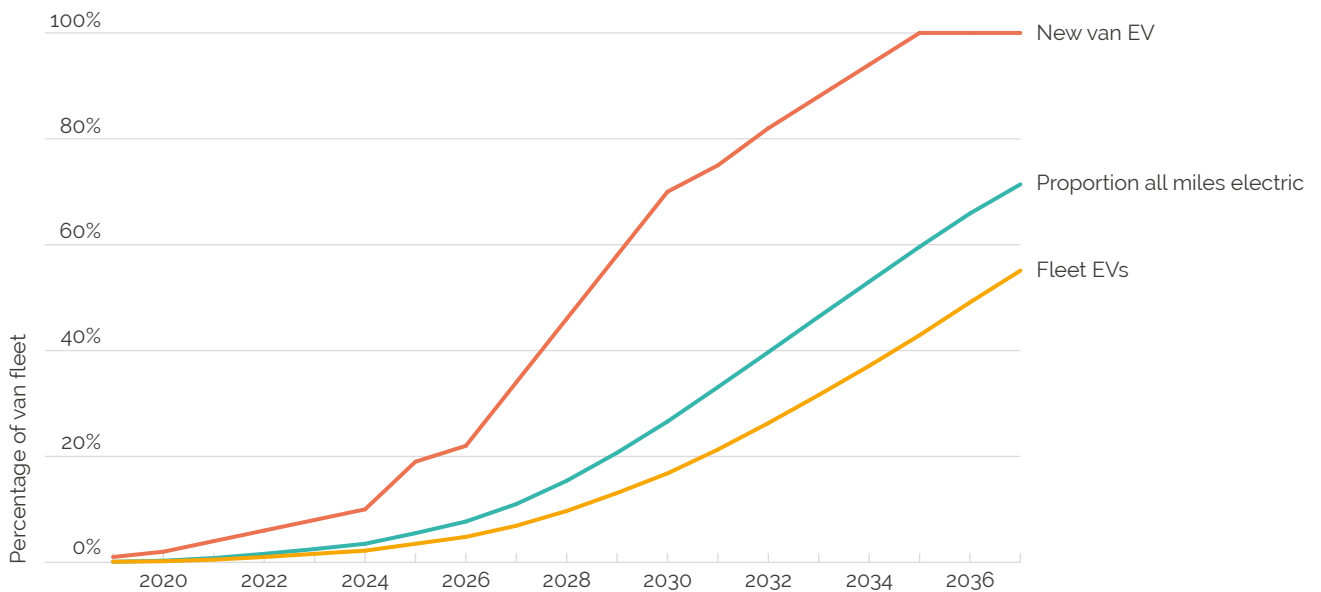


Figure 12: Estimated impacts of ZEV mandate on vans (Source: DfT for TDP and Author analysis ZEV mandate)

If we now superimpose the estimated impacts of the zero emission vehicle (ZEV) mandate onto the charts anticipated in the TDP, it is possible to understand how the ambition between the TDP and the proposed policy pathway in the ZEV Mandate relate (Figure 13).

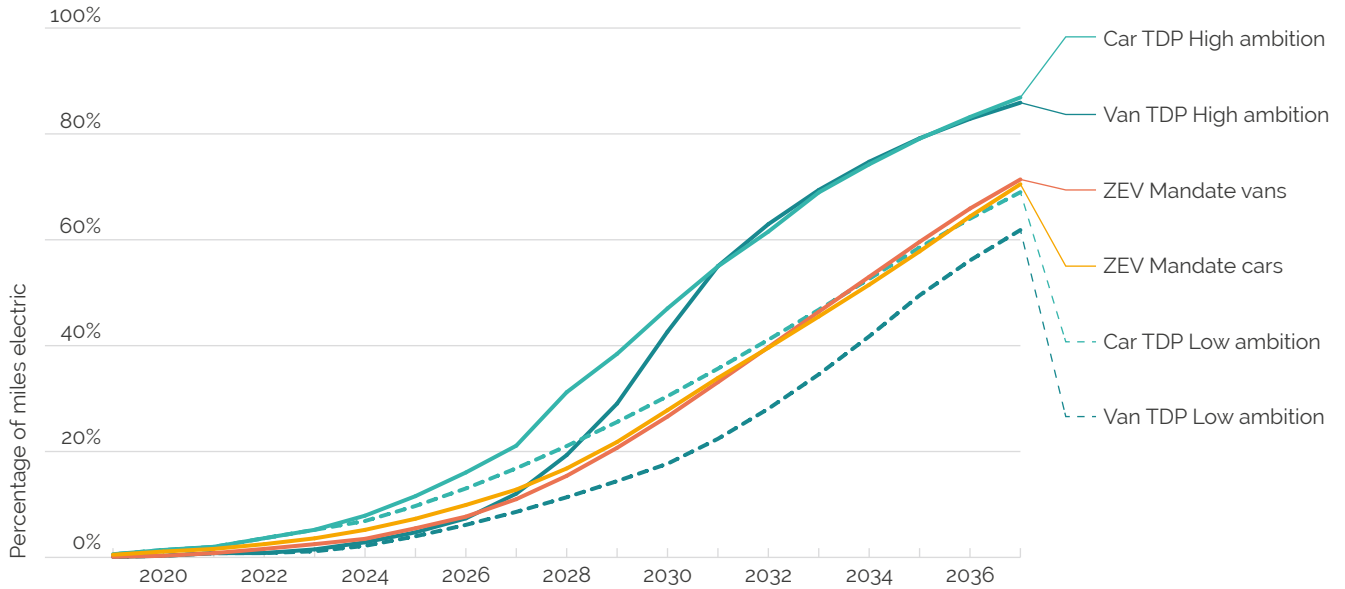


Figure 13: Estimated ambition of ZEV mandate relative to TDP High and Low ambition

The ZEV mandate tracks reasonably close to the lower ambition TDP pathway for cars. For LGVs it is slightly ahead in the early period but trends closer to the lower ambition TDP pathway from around 2030. The net position of the ZEV mandate is for the pace of switch of technology to be around 3 years slower than anticipated in the most ambitious scenario in the TDP.

Arguments could be made about whether to include miles driven by plug-in hybrid vehicles as electric miles. However, the calibration of the model already assumes significant technology improvements to overall non-EV emissions of which an increase in hybridisation is one component. No assumptions have been included about the impacts of battery degradation on potentially reducing the mileage of older EVs later in the period. The impacts of different assumptions are explored in the next section. The discussion about what should or should not be assumed keeps model builders busy. However, these assumptions should be published as standard by the DfT when scenarios are produced.

It is difficult to estimate the impact of the ZEV mandate on the efficiency of the remaining vehicle fleet. The ZEV mandate is proposing to fix the CO₂/mile rating for manufacturers at their fleet average 2021 level for the Worldwide Harmonised Light Vehicle Test Procedure (WLTP) cycle for all non zero emission rated vehicles. The ZEV mandate says that its aim is to drive the uptake of EVs and therefore its baseline proposals is that the frameworks do "not seek to encourage new investment to significantly increase the efficiency of the non-ZEV fleet.

Rather, it seeks to ensure that the fleet does not become less efficient over time." (DfT, 2023, p42). Alternative scenarios of tightening by 2% a year and reversing the increase in upsizing of vehicles have also been proposed in the consultation (reductions of 2.4% per annum). This results in a hypothetical change in vehicle performance as shown in Table 6. The levels of change anticipated in the ZEV mandate all translate to a lower level of vehicle efficiency in non ZEV vehicles than appears to have been included in recent modelling as shown in Figure 5. However, there will also be improvements in conventional vehicle emissions per mile as a result of increased biofuels.

Table 6: Indicative changes in WLTP tailpipe emissions under three ZEV mandate scenarios (adapted from DfT, 2023, page 43)

Scenario	2021	2024	2025	2026	2027
Flat	150	150	150	150	150
Tightening	150	150	147	144.1	141.2
Lightweighting	150	150	142	140	139

The final uncertainty surrounds the production of equivalent legislation for heavy duty vehicles, where the technology pathways, particularly for heavier classes, remains more uncertain. The assumptions set out by the CCC in the Balanced Pathway for the 6th CB have been assumed for HGVs unless otherwise stated.

Looking across the different vehicle classes on rates of switch to electric vehicles, it seems that the most ambitious pathways considered in 2021 are now well out of reach. There also remains a considerable risk over the realisation of anticipated improvements to efficiency of the non-electric fleet.

Nonetheless, the shift to electric vehicles is underway and, within a decade, the position will be transformed relative to today. In a decade, perhaps as much as 50% of mileage will be driven in electric vehicles for cars and vans. If achieved, this would represent a major part of the decarbonisation effort over the period.

Whilst positive from a decarbonisation perspective, this is also providing the most significant shift in the relative costs of travelling for several decades. The cost per mile of driving an electric car is currently around 8p per mile whilst for a fossil fuel vehicle it is around 17p per mile (Vanarama, 2023). The Department for Transport's analysis in the National Road Traffic Projections (DfT, 2022) acknowledges that lower motoring costs will drive up congestion. In the absence of any change to how motorists pay for travel then this will drive up congestion externalities, thus undermining the economic efficiency of the shift. Such a change will also undermine the competitive position of bus and rail for more journeys. Whilst there is talk of changing to the way we pay for travel, the CBDP contains a suite of policies out to 2037 and none of them include changes to pricing. As things stand, the policy pathway will undermine public transport and increase congestion.

Importantly, the pathway will also generate significant unfairness. The more than 50% savings in per mile costs of driving an electric vehicle accrue to those who can afford an EV and, in particular, can charge at home. By 2030 around 66% of all cars under 3 years old will be electric whilst fewer than 10% of cars over 10 years old will be electric. Those who can least afford access to newer vehicles will be paying more than twice as much per mile to drive as those who are better off. The Zero Emission Vehicle Mandate will legislate for this inevitability. The absence of any compensatory mechanisms means that this will be anything but a just transition.

6. Scenario analysis of carbon pathways

As shown in Section 2, it is now policy to plan for delivery of the least ambitious scenario space set out by the Transport Decarbonisation Plan. This is the result of:

- planning for road traffic growth which is towards the higher end of the TDP envelope;
- legislating for rates of electrification which are in the lower half of the TDP range; and
- legislating for zero or low ambition on vehicle efficiency for new fossil-fuel powered vehicles.

This section explores some scenarios to demonstrate how influential different assumptions might be to carbon outcomes.

The scenarios modelled (Table 7) are all presented relative to a baseline which contains the following assumptions:

- NRTP Core Traffic
- ZEV mandate electrification
- Calibrated vehicle efficiency (as per Figure 5)

They are also compared to the CCC's estimation of emissions for cars, vans and HGVs in the Balanced Pathway of the 6th Carbon Budget. An allocation for Bus, Rail and 'Other' surface transport emissions (6.4 MtC in 2019 declining to 2 MtC in 2037) is common across each scenario.⁶

⁶ The assumptions for bus rail and other are set out in the [accompanying data sheets](#).

Scenario	Traffic	Electrification	Efficiency
Baseline	NRTP Core	ZEV mandate for vans and cars	Calibrated
High Traffic 10	NRTP Core with a 10% growth by 2030 maintained	ZEV mandate for vans and cars	Calibrated
High Traffic 20	NRTP Core with a 20% growth by 2030 maintained	ZEV mandate for vans and cars	Calibrated
Low Traffic 10	NRTP Core with a 10% reduction by 2030 maintained	ZEV mandate for vans and cars	Calibrated
Low Traffic 20	NRTP Core with a 20% reduction by 2030 maintained	ZEV mandate for vans and cars	Calibrated
Max TDP EV ambition	NRTP Core	TDP FOI high ambition scenario	Calibrated
Min TDP EV ambition	NRTP Core	TDP FOI low ambition scenario	Calibrated
No new efficiency	NRTP Core	ZEV mandate for vans and cars	Zero efficiency
Limited efficiency	NRTP Core	ZEV mandate for vans and cars	25% of calibrated efficiency
Moderate efficiency	NRTP Core	ZEV mandate for vans and cars	50% of calibrated efficiency
Ambitious efficiency	NRTP Core	ZEV mandate for vans and cars	25% more than calibrated efficiency
All On	NRTP Core with a 20% reduction by 2030 maintained	TDP FOI high ambition scenario	25% more than calibrated efficiency
All Off	NRTP Core with a 20% growth by 2030 maintained	TDP FOI low ambition scenario	Zero efficiency

The cumulative emissions for all of the scenarios are shown in Figure 14. A breakdown of the performance relative to the 6th Carbon Budget Balanced Pathway for different efficiency, traffic and electrification scenarios is shown in Figures 15 to 17.

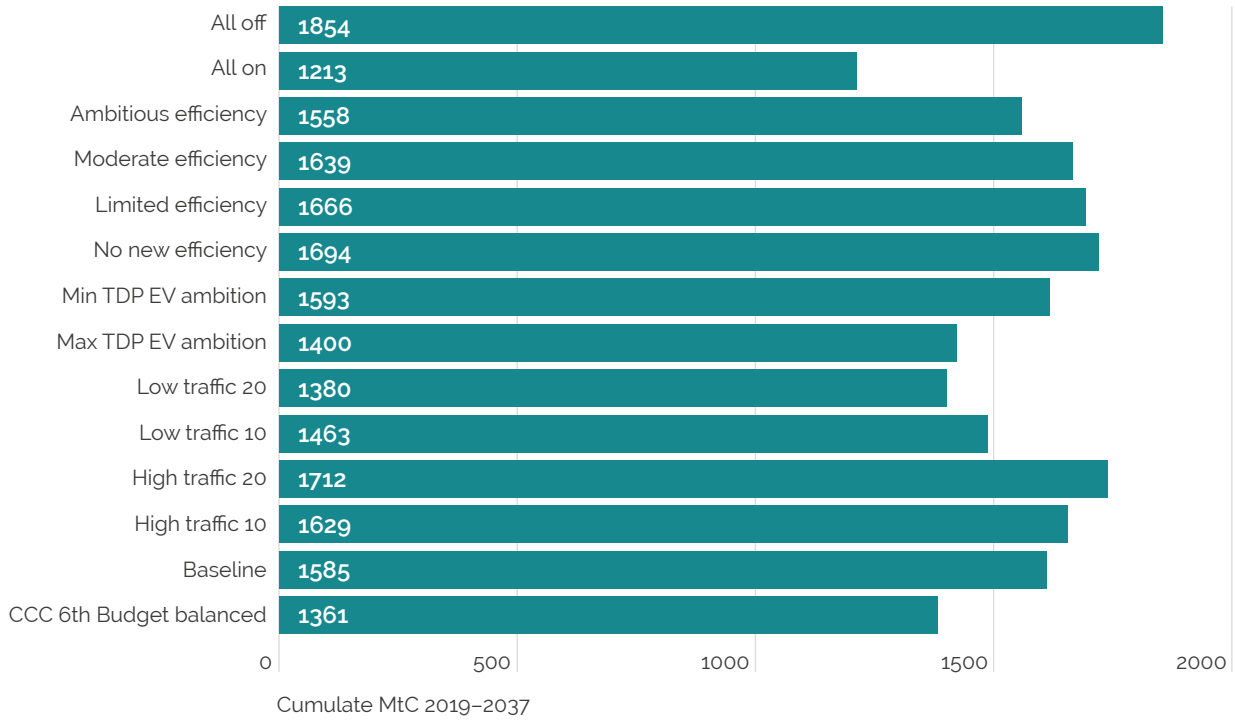


Figure 14: Cumulative emissions 2019–2037 all scenarios

The Baseline scenario, which reflects core government assumptions on traffic growth and electrification alongside significant efficiency gains in the fossil fuel fleet exceeds the 6th Carbon Budget Balanced pathway by 171 MtC. This can be interpreted as the reduction in carbon ambition since December 2020 for surface transport emissions.

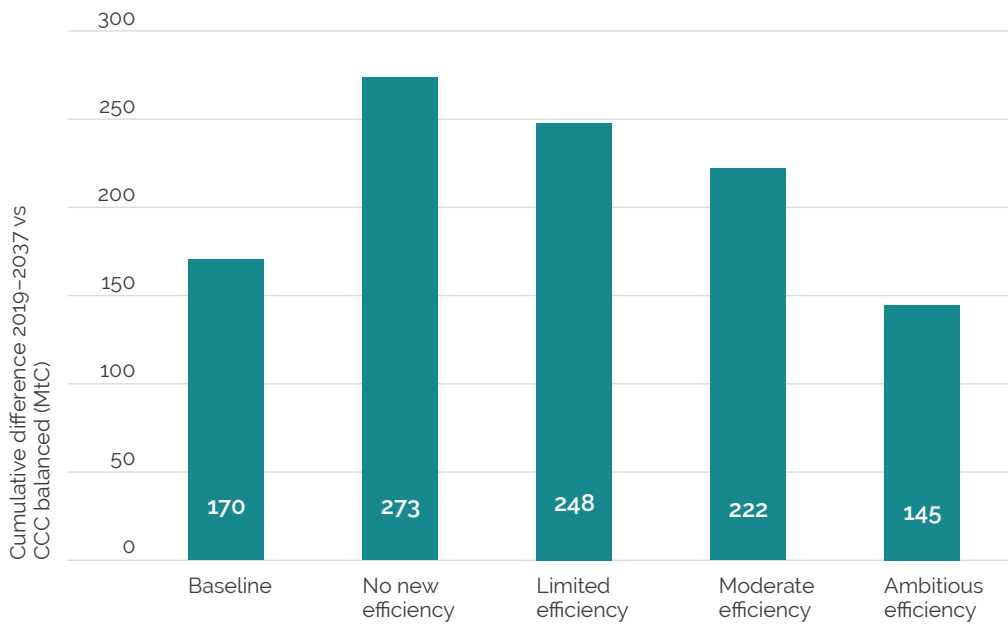


Figure 15: Cumulative emissions relative to CCC 6th Carbon Budget balanced pathway for surface transport under different fossil fuel efficiency scenarios

The assumptions on the vehicle efficiency for fossil fuelled vehicles are not clearly set out in the TDP and nor are the implications of the proposals in the ZEV mandate. The calibration work suggests quite substantial levels of efficiency improvements were assumed in the TDP but the ZEV mandate will not necessarily ensure those are realised. Figure 15 explores the implications of different efficiency positions. If no overall fleet efficiencies are realised then the 6th Carbon Budget Balanced pathway would be exceeded by 333 MtC. This points to the critical importance of focussing not just on electrification but on the composition and emissions of the total vehicle fleet. Greater clarity is required here on what the DfT is assuming, as this is a major area of delivery risk.

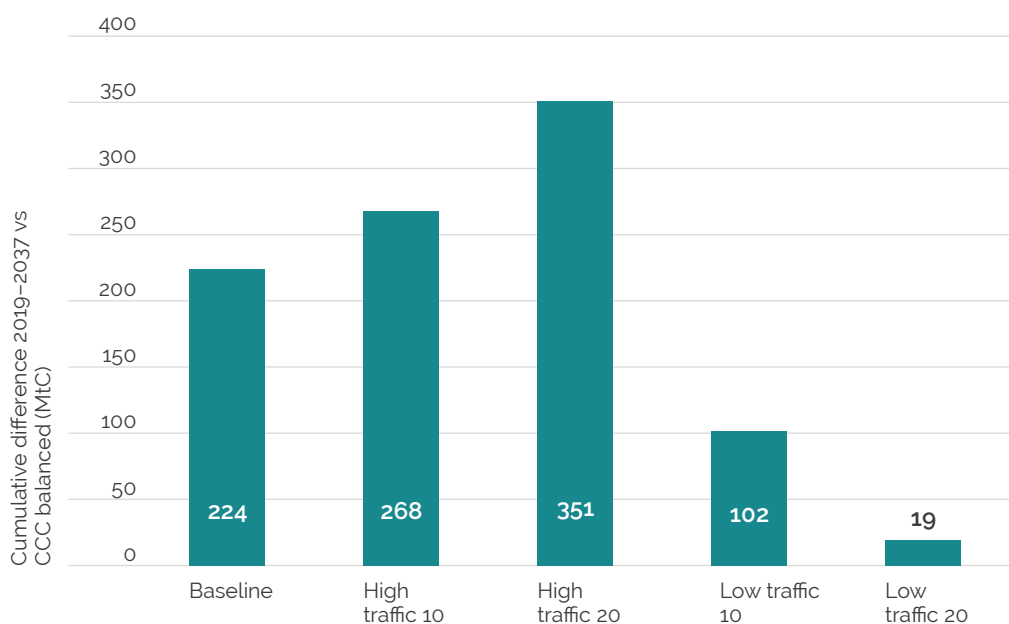


Figure 16: Cumulative emissions relative to CCC 6th Carbon Budget Balanced pathway for surface transport under different traffic growth scenarios

If we take the calibrated vehicle efficiency improvements as achievable then the only two variables remaining are the traffic levels and degree of electrification. The ZEV Mandate fixes the likely pathway for electric vehicle uptake and, whilst there is some potential variation in assumptions which can be made about the miles travelled in electric vehicles which result, the assumptions from Figure 13 are applied here to enable the impact of different travel demand scenarios to be modelled. In Figure 16, the Baseline assumes the NRTP core traffic levels. Traffic growth of 10% above the NRTP core by 2030 adds 44 MtC over the period, whilst 20% growth adds 127 MtC. The greater that traffic growth is early in the period, when fewer vehicles are electric, the more significant the impact.

By contrast, reducing traffic growth across all vehicle classes by 10% by 2030 and then allowing the absolute year on year growth from NRTP core for 2030–2037 to appear reduces emissions by 122 MtC with a 20% reduction saving 205 MtC. This is one of only two scenarios run which is close to the 6th Carbon Budget Balanced Pathway.

This suggests that, given the technology pathway which has been selected, traffic reduction of 20% relative to current plans is required to stay in line with the 6th Carbon Budget pathway (a 19 MtC overshoot). Pathways based around NRTP Core all mean that the transport sector will significantly exceed the emissions budget anticipated by the CCC.

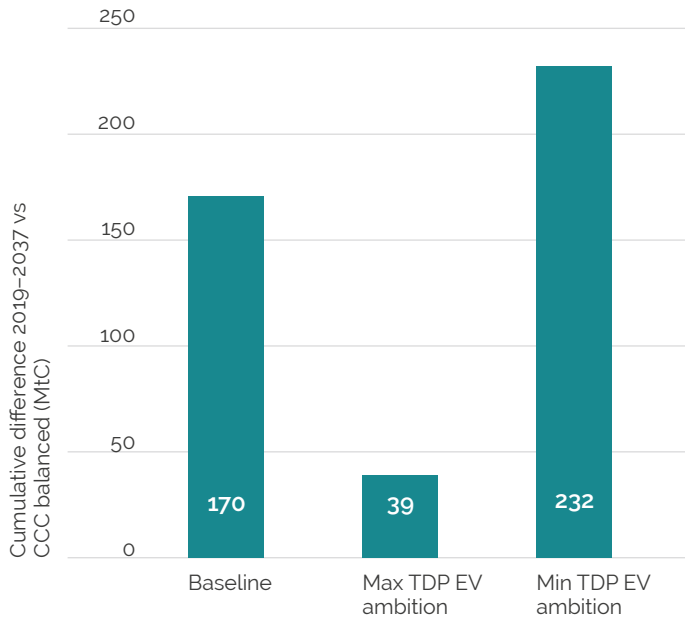


Figure 17: Cumulative emissions relative to CCC 6th Carbon Budget balanced pathway for surface transport under different electrification scenarios

Turning then to the impacts of more (and less) ambitious electrification pathways, we see that even the most ambitious EV pathway suggested by the TDP would not, with NRTP Core traffic growth and significant conventional vehicle efficiency, meet the CCC’s 6th Carbon Budget expectations. Whilst it should not be assumed that the presence of the ZEV Mandate will necessarily lead to the draw through of electric vehicle miles driven in this report, the legislation is fixing down a key variable. Exploring substantially different “what ifs” for other technology uptake scenarios (other than for HGVs) is increasingly a distraction.

Figures 15 to 17 breakdown the different key components of change to the carbon outcomes and control the other two variables. Two scenarios “All On” and “All Off” were created to explore the impacts of greater or lesser ambition across all three elements. Figure 18 shows the way in which those pathways perform over time relative to the surface transport components of the TDP and the 6th Carbon Budget Balanced Pathway.

The ‘All On’ scenario shows that with the TDP maximum ambition EV uptake, 20% lower traffic in 2030 and an enhanced efficiency approach for fossil fuelled vehicles an outcome 148 MtC below the CCC pathway can be obtained. By contrast, ‘All Off’ has growth in traffic, no efficiency gains in the fossil fuel fleet and low TDP electrification uptake.

This results in a growth in anticipated emissions early in the period before the impacts of electrification begin to dominate. This outcome is 493 MtC higher than anticipated by the Balanced Pathway in the 6th Carbon Budget.

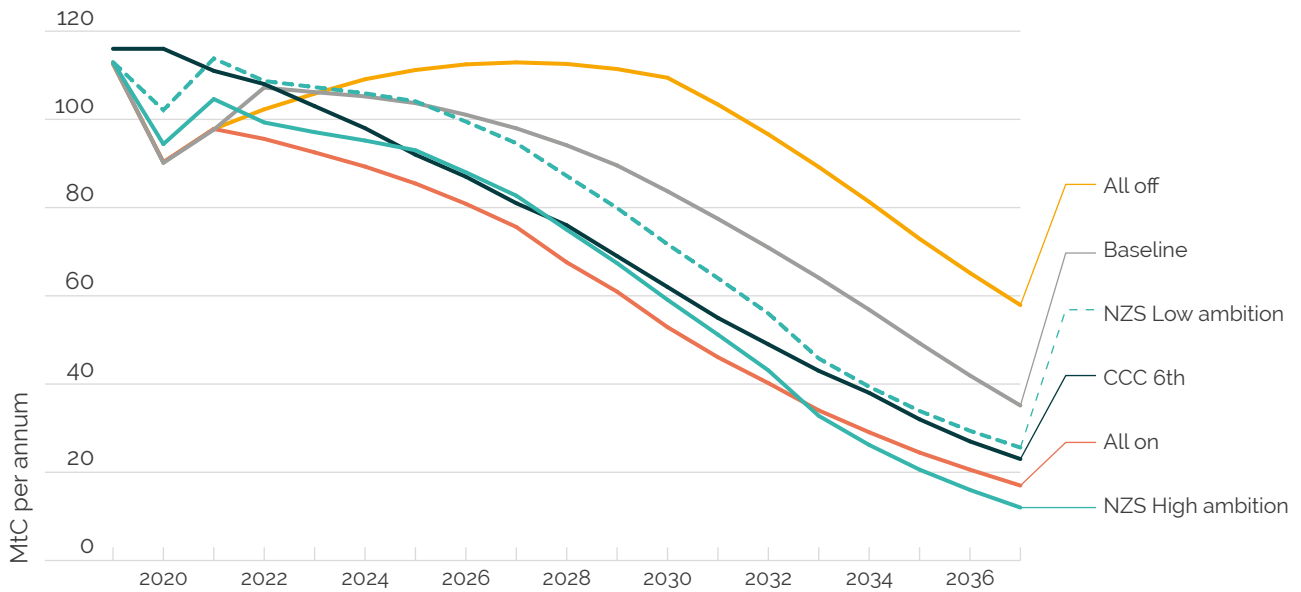


Figure 18: Pathway performance of All on and All off scenarios

Scenarios which include 20% traffic reductions by 2030 relative to current plans can still be compatible with the ambitions set out by the CCC in the 6th carbon budget. Overall traffic levels in 2037 would also need to be lower than pre-pandemic levels. Even these would require significant progress in both electrification and the efficiency of the remaining fossil fuel vehicle fleet.

7. Implications and where next?

Transport has been the laggard sector in carbon reduction for 30 years. Whilst the TDP included some bold and exciting pathways for carbon reduction from surface transport, the analysis in this report suggests that 72% of the ambition has been abandoned or deemed unnecessary.

The Government is planning for ambitious, but slower than originally deemed possible, electrification of cars and vans, with HGV legislation to follow. Quite considerable expectation appears to be loaded onto the improvements to the efficiency of the remaining fossil fuel fleet and this remains a significant risk. There is almost no expectation of measures on mode shift or travel demand management and there is a plan for traffic growth. Together, these outcomes demonstrate why there has been a lowering ambition for the contribution of surface transport to emission reduction goals.

Part of this shift away from travel demand reduction may be attributable to overly optimistic estimates of the potential impacts of the Covid-19 pandemic on future travel behaviour at the time the TDP was written. Whilst the post-pandemic behavioural changes continue to see lower car traffic, little has been done to capitalise on this (Anable et al., 2022). The failure to grasp this opportunity, coupled with a tight fiscal position for the public sector and continued lower patronage and service reductions on public transport seems to have pushed policy away from the potential for traffic reduction back to traffic growth. The analysis in this report is consistent with previous work (Hopkinson et al., 2021) which shows that the only pathways which align with the CCC's assessment of the necessary contribution from surface transport include a 20% traffic reduction by 2030, as set out in Scotland.

England is currently in a false prospectus on transport and climate change. Many local authorities have set ambitious targets for carbon reduction which are way beyond the national ambition, particularly as the national ambition has been reduced. It is inevitable that there will be a delivery mismatch with, it seems, far less emphasis being placed on behaviour change nationally than has been deemed necessary and desirable locally. The forthcoming round of Local Transport Plans is an opportunity to re-align ambition across scales. But in what direction? Will local authorities accept the downgrading of ambition or demand a different approach from national government?

Worse still could be a failure to recognise the gap between aspirations and policy and drift along with well intentioned but undeliverable promises.

Whether transport can really backtrack on the emissions reduction goals that the CCC estimated as necessary as recently as December 2020 will need to be assessed by the CCC in its 2023 Progress Report to Parliament. For this to be credible, it would seem necessary for other sectors to be ahead of where they had been and for the level of delivery risk in other sectors to be low. There is a danger that sectors that claim to be difficult to decarbonise will seek shelter in, as yet, unrealised technological progress elsewhere in the economy rather than taking the difficult choices that will open up different pathways now.

Figure 19 below shows part of the monitoring framework set out by the CCC in its 2022 Progress Report to Parliament (CCC, 2022). On it are superimposed preliminary RAG assessments of progress based on the data reviewed in this report. Whilst a fuller account will be provided by the CCC in July, it seems essential that the accounting and accountability frameworks we have in place to assess decarbonisation reflect the data and policy commitments adopted. As a result of the data surrounding the FOI and a range of policy commitments set out by DfT in the past year, the state of different flagstones in the pathway is now much clearer.

The assessment in Figure 19 gives an easy visual confirmation of the lack of balance in the current strategy. Planning for the electric transition is essential. However, in the absence of a sufficiently ambitious travel demand management programme and changes to the fiscal system there will be a growth in congestion, an undermining of the position of some public transport services, a widening of social injustice with drivers of newer EVs paying half the per mile cost of motoring of those holding older cars. As well as not meeting the ambitions set out by the CCC, this is not good transport policy.

In 2021, CREDS published a series of scenarios, referred to as Positive Low Energy Futures (PLEF). The PLEF transport report set out alternative pathways which could save energy and carbon but still allow society to flourish (Brand et al., 2021). Pathways with reductions in car mileage will require a step change in funding and delivery of alternatives to the car which is not currently being planned for. Every year that passes with business as usual transport delivery reduces the potential to shift to such pathways. If there is not a step change in our approach to behaviour change in the next five-year Local Transport Plan period then it feels as though it will be too late as there will be a firmer lock-in to a more car dependent electric future which itself will undermine the alternatives.

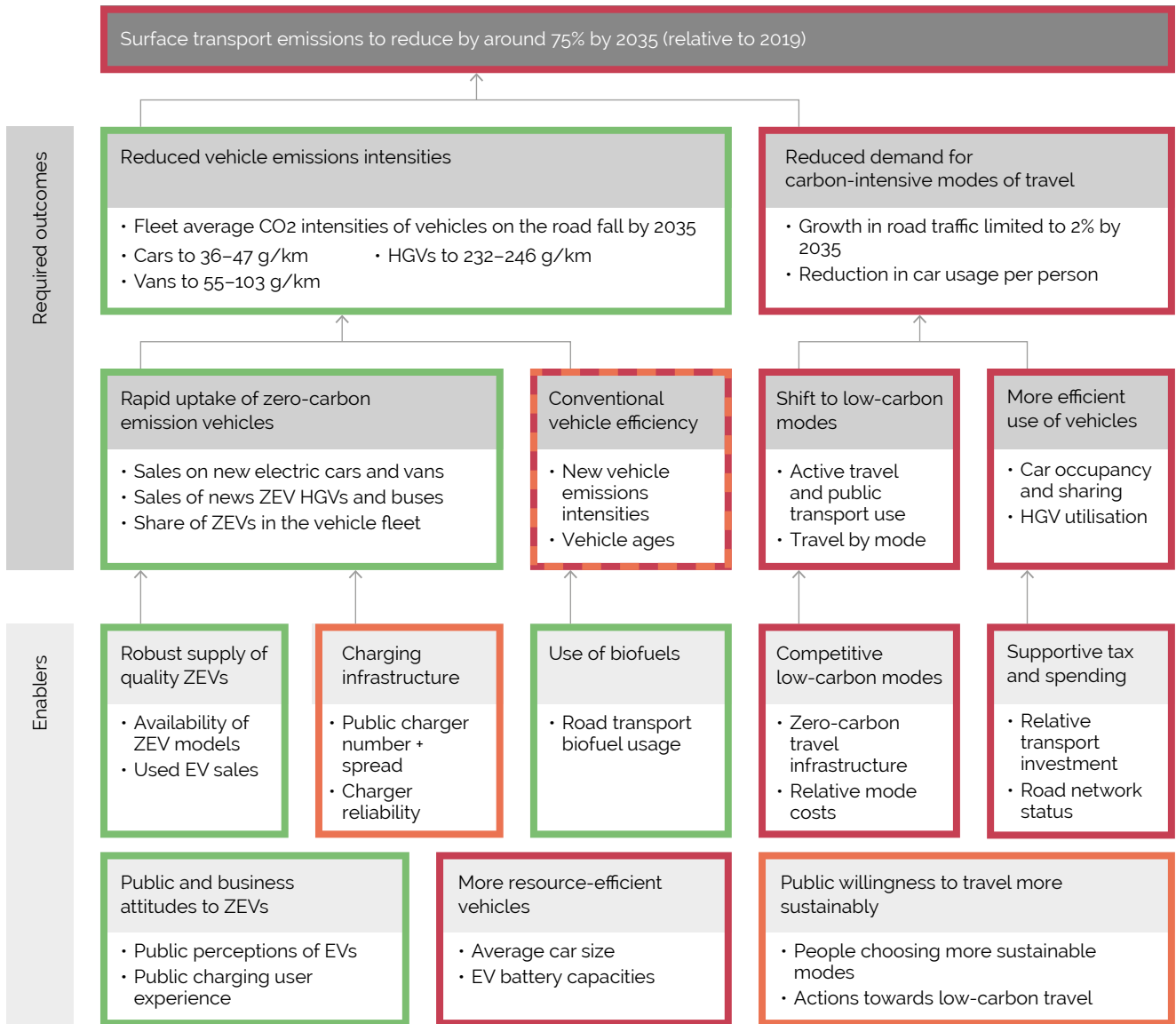


Figure 19: RAG assessment of outcomes and enablers in CCC Monitoring Framework (Source: CCC with Author's assessment). Red outline denotes off track, orange denotes unclear, green denotes on track

Finally, it is essential that there is greater transparency and sharing of the data and implications of the policy choices being made. The Information Commissioner has been clear, it is in the public interest to have access to that information. Only then can meaningful debate be had about the difficult choices ahead. National and local governments need to be held to account for the actions they propose and the ones they avoid.

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About DecarboN8

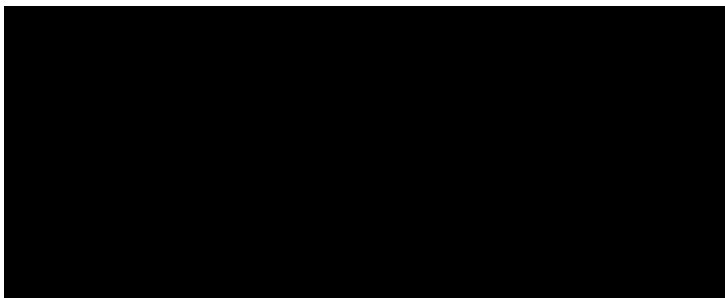
DecarboN8 is an EPSRC-funded network to bring together business, government and academia across the North of England. It aims to trial and accelerate the adoption of low carbon transport solutions. DecarboN8 is funded by UK Research and Innovation, Grant agreement number EP/S032002/1

About CREDS

The Centre for Research into Energy Demand Solutions (CREDS) was established as part of the UK Research and Innovation's Energy Programme in April 2018, with funding of £19.5M over 5 years. Its aim to understand the role of energy demand change in accelerating the transition to a zero carbon energy system, including the technical, social and governance challenges of demand reduction, flexible demand and use of decarbonised energy. CREDS has a team of over 140 people based at 24 UK universities.

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