



Cambourne to Cambridge Busway – Public Inquiry

Carbon assessment responses

14/10/2025

Prepared for

Greater Cambridge Partnership

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Background to the Challenge and Associated Response

1. This Note deals with matters raised at the Cambourne to Cambridge Busway (the Scheme) public inquiry on Tuesday 23rd September 2025.
2. CPPF has indicated in subsequent correspondence that its particular concerns are two-fold:
3. First, *'[t]he Applicant's position as to whether the right TAG data book was used for the GHG Assessment in the ES and, if not, whether the failure to use the most up to date TAG data book was material to the assessment. As you know, CPPF's position is that the assessment (dated May 2023) was based on the May 2022 TAG data book when it should have been based on the November 2022 TAG data book (which was published on 30 November 2022) and that the differences between the two data sets were material.'*
4. Secondly, *'[t]he Applicant's explanation as to why there was an increase from -30,960 tCO₂e to -56,915 tCO₂e when the data from the CSRM was updated from the E-Series to the F-series.'*
5. Both matters are addressed below. However, it is not considered that CPPF's formulation entirely captures the matters on which the Inspectors sought clarification regarding (1) the relationship between the traffic modelling and the carbon assessments; and (2) the significance of using different methodologies to extrapolate results beyond 2050. Accordingly, this note addresses these matters further.

Summary of Key Points

SCHEME IMPACT

6. The Scheme results in a reduction in user carbon emissions. This is expected, as transport model forecasts show a reduction in vehicle kilometres travelled in each forecast year.

TAG VALUES USED

7. With reference to the first of CPPF's concerns as stated above in paragraph 3, the methodology chosen for the original assessment utilised the most recent TAG parameters at the time of each component assessment, noting that the traffic model and modal shift were assessed separately at different times. The methodology was compliant with a best practice approach to carbon quantification at the time of the assessment.
8. The carbon assessment of the traffic model outputs could have been updated to use the November 2022 TAG data book [v1.20.1] as was the case with modal shift. However, this was not a proportionate approach in the circumstances given the frequency of updates to the data book and the time required to coordinate the submission of the Environmental Statement. Even if the November 2022 TAG data book [v1.20.1] had been used as CPPF appears to contend, this would not have materially changed the conclusions in the ES. The May 2025 TAG data book has since been applied to both the assessment of modal

shift and the traffic model, the results are available in Andy Saunders' Appendix to his proof evidence [Appendix C] [CD26-01-APP-W3-2, PDF pages 17-24].

DIFFERENCE BETWEEN ASSESSMENTS

9. With reference to the CPPF's second concern as stated above in paragraph 4, the estimated carbon reductions from the 'F-series' model forecast are greater than 'E series' model forecast because the F-series forecasts greater reductions in vehicle kilometres.
10. The carbon reductions from the F-series with TAG May 2022 are higher than the F-Series with TAG 2025 due to vehicle fleet assumptions and changes in TAG parameters. In TAG 2022, the fleet is 34% electric vehicles in 2041, while in TAG 2025, the fleet is 75% electric vehicles in 2041, which reduces the emissions savings associated with changes in traffic.
11. Greater reductions in vehicle kilometres paired with the low proportion of electric vehicles in the May 2022 TAG data book contribute to "an increase from -30,960 tCo2e to -56,915 tCO2e when the data from the CSRM was updated from the E-Series to the F-series". This is addressed further in paragraphs 75–77 - Magnitude of carbon impact between the E-series and the F-series.

ESTIMATING EMISSIONS BEYOND THE FINAL MODELLED YEAR

12. In the original assessment, the carbon assessment result for the final modelled year (2036 for E-series, 2041 for F-series) was applied to every subsequent year up to the final year of the Scheme assessment (2085 for E-series assessment and 2087 for F-series assessment). This has the effect of compounding the differences between assessment results.
13. The original assessment methodology was considered best practice at the time in the absence of any specific guidance on estimating emissions beyond the final modelled year. This is addressed in greater detail in paragraphs 50-57.
14. Guidance on extrapolation beyond the final modelled year became available in August 2025 when the Department for Transport released their Quantifiable Carbon Reduction Guidance or 'QCG' [CD8-41 paragraph 7.46]: *"If the last modelled year is a long time (for example more than 5 years) from 2050, then a 2050 estimate for link flow and speeds should be produced by extrapolating the last modelled year's data and TAG Data Book 2050 data to capture the full extent of fleet composition changes published in the TAG Data Book."* For years beyond 2050, QCG [CD8-41 paragraph 7.47] suggests: *"Data for appraisal years beyond 2050 can be held constant up to the end of the assessment period (extrapolated horizontally)."*
15. An additional assessment, using this methodology prescribed in QCG is shown in Table 3.
16. In this assessment, 2041 traffic model forecast data has been used alongside TAG data book assumptions (e.g., electric vehicle percentage) for 2050 to produce an estimate of impacts in 2050. The 2050 emissions result is then assumed to remain constant for every subsequent year up to the final year of the scheme assessment.
17. While this approach produces a slightly tempered estimate relative to the original assessment, the result of this approach confirms that applying the new QCG methodology

does not change the significance of effects of the Scheme on carbon as reported in the Environmental Statement.

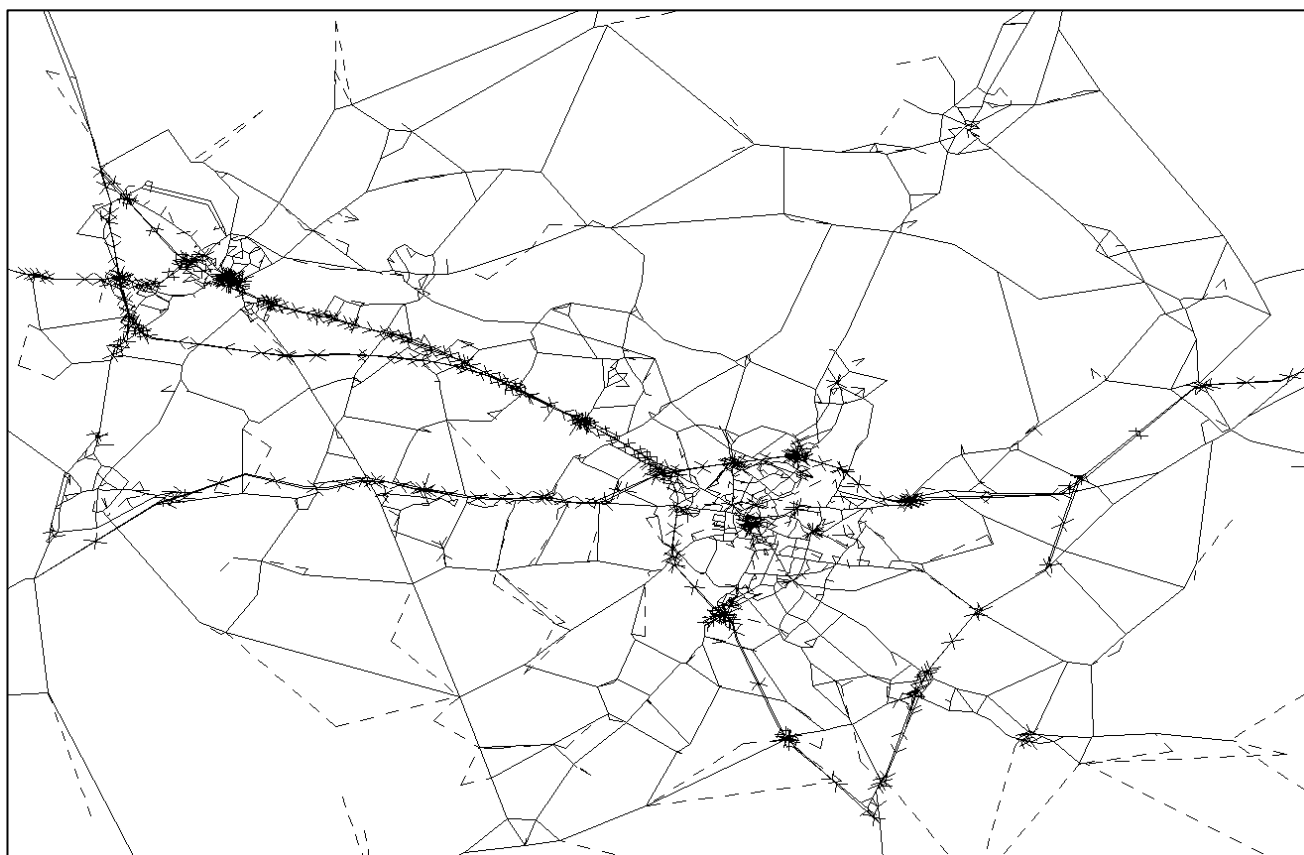
18. QCG [CD8-41 paragraph 7.47] also presents an alternative approach to estimating emissions beyond 2050: rather than applying the 2050 estimate of emissions to subsequent years in the assessment period, *“the annual change to extrapolating between the final two modelled years could be applied beyond the final modelled year if considered appropriate”*. This approach is not appropriate in this case because extrapolating the trend between 2041 and 2050 to the end of the assessment period would imply electric vehicle uptake exceeds 100% before the end of the assessment period, which is not possible.

Issues Raised and Responses

The study area used for the operational carbon assessment

19. To contextualise the later matters in this Note, the study area is explained here.
20. The study area used for the traffic modelling is presented below. Broadly, the model runs from St Neots to the west, Ely to the north, Newmarket to the east and Saffron Walden to the south. The area of the traffic model is the same for both the E- and F-series. The carbon assessment is based on the outputs from the traffic model and associated study area.
21. With reference to Figure 1, all A- and B-roads within this area, in addition to some minor local roads are included in the traffic model.

Figure 1 – Full traffic model area



Inputs to the carbon assessment

22. The assessment of carbon impacts associated with changes in general traffic uses transport model forecasts of traffic flows (Annual Average Daily Traffic (AADT)), speeds, distance and vehicle type, at a link level.
23. The 2022 carbon assessment used outputs from the 'E-series' Cambridge Sub-Regional Model (CSRM) and Simulation and Assignment of Traffic to Urban Road Networks (SATURN) software to calculate changes in vehicle kilometres. The final modelled year at this time was 2036. The 'E-series' outputs did have an element of 'model noise' i.e., changes in flows and delays occurring quite far away from the Scheme area e.g., East Cambridge, which were clearly not associated with the introduction of the Scheme. This may have had the effect of dampening the actual effect of the scheme, which is essentially a reduction in vehicle kilometres due to modal shift and shorter car journeys.
24. The revised assessments in July 2025 were able to use updated 'F-series' model outputs which are considered to be more robust than the 'E-series' because the 'F-series' base model had been re-calibrated to 2019 data (while the E-series' base was 2015) and the final modelled year for this model was 2041. Further, the 'F-series' model showed much less 'model noise' elsewhere in Cambridge.
25. The 'F-series' traffic model predicts a reduction in vehicle kilometres due to the introduction of the scheme which, based on professional judgement and experience, appears commensurate with the Scheme and which is not masked by 'model noise' elsewhere. Both the F-series E-series predict a reduction in vehicle kilometres but to different extents.
26. Both the F-series E-series have over 4,500 modelled links by direction in the modelled area.

The chronology of the TAG data book versions and when and how have they been used

27. CPPF raised an issue in relation to the use of the May 2022 TAG data book (v1.18) compared with the November 2022 TAG data book (v1.20.1). On Tuesday 23rd September, Jack Parker acting for CPPF presented **CD29-16 Tag Guidance Web Archive, 3 November 2022**.
28. The chronology of assessments and the release of TAG data books is as follows:
 - 1) November 2021 data book release. In Appendix ES4 - ES Scoping Report and Opinion [**CD1-10.05**], no commitments were made with reference to the use of specific TAG data books.
 - 2) May 2022 data book release. This was used to complete the carbon assessment reported in the ES.
A draft Environmental Statement was produced and consulted on in summer 2022 [**CD1-06.12**] (prior to quantified assessment).
 - 3) In September 2022 the GCP Executive Board approved the submission of the Transport Works Act Order (TWAo) [**CD10-018**] on the basis of the consultation.

- 4) 30th November 2022 data book release. This came into effect after the assessment of traffic modelling derived user emissions presented in the Environmental Statement were initially completed on the 18th October 2022 and the modal shift assessment on 25th October 2022. These assessments were reviewed on the 3rd November 2022.
 - 5) In March 2023, Cambridgeshire County Council approved submission of TWAO **[CD11-02]** based on a mostly complete submission of the Environmental Statement. There was then a hiatus as a result of the Environment Agency blocking the Bourn Airfield development **[CD26-12 REP-09 Page 19]** which stopped progression of the submission.
The modal shift assessment is updated following a carbon workshop (see paragraphs 44 to 49 below).
 - 6) May 2023 data book release.
 - 7) November 2023 data book release.
 - 8) May 2024 data book release.
 - 9) November 2024 data book release.
The Environmental Statement was published in Nov 2024. This used the carbon assessment which is referred to in Andy Saunders' Appendix to his proof evidence [Appendix C] [CD26-01-APP-W3-2, PDF pages 17-24] as the May 2023 carbon assessment.
 - 10) May 2025 data book release (which is used to update the carbon assessment for public inquiry in July 2025).
29. In response to the CPPF's first correspondence item (paragraph 3), while the metrics in the TAG data books have changed due to the release of updated versions, component carbon assessments (modal shift and the traffic model assessment) were completed with the correct version at the time of each assessment, noting that the carbon assessments of modal shift and the wider traffic model were completed separately, at different times using different TAG data books.
 30. More particularly, modal shift was assessed using the November 2022 TAG data book (v1.20.1) while the traffic modelling derived user emission calculation used the May 2022 TAG data book (v1.18)¹. This was correct when the respective component assessments were completed.
 31. In the original assessment of whole-life carbon, quantification of the traffic modelling derived user emissions and modal shift was completed in October 2022. The TAG data book 'Forthcoming changes' were not used because they were not an active dataset and represented as possible indication of future changes only.
 32. As Mr Saunders explained in his appearance at the Public Inquiry on Tuesday 23rd September 2025, the Department for Transport update the TAG data book typically every six months, in May and November of each year. Often, they will release a 'Forthcoming

¹ The modal shift assessment and the traffic modelling derived user emission calculation are both combined in the whole-life carbon assessment which was presented in the Environmental Statement [CD1-10.01 Environmental Statement (ES Main Report)].

Changes' version in advance of the formally updated data book to illustrate any expected changes. It is not best practice to utilise the 'Forthcoming Changes' version in advance of the actual update to the TAG data book because a 'Forthcoming Changes' data book is not formally in use.

33. In May 2023, when the modal shift assessment was updated, traffic modelling derived user emissions were not updated on the basis of proportionality, as supported by The Department for Transport's January 2014 guidance on proportionate update applies (TAG TPM - The Proportionate Update Process) (see also paragraph 47 below and Appendix B below). This acknowledges the rate at which the TAG data book is updated (see also paragraph 8 above), as it may not be proportionate to update all assessments across a submission every six months, i.e., with the release of every new TAG data book.
34. It is correct that the November 2022 TAG data book (v1.20.1) has higher electric vehicle uptake than the earlier May 2022 data book, and therefore using the November 2022 data would have tempered the benefits in the original carbon assessment presented in the Environmental Statement [CD1-10.01 Environmental Statement (ES Main Report)]. Nonetheless, this would not have changed the fact that the assessment estimated a reduction in vehicle kilometres and associated emissions. Additionally, updating to a data book with even greater electric vehicle proportion does not change the significance of effect.
35. In any event, an assessment using the latest TAG data book (May 2025, v2.01) has now been completed using the F-series model data, which supersedes the above assessments. This is presented in Andy Saunders' Appendix to his proof evidence [Appendix C] [CD26-01-APP-W3-2, PDF pages 17-24]. The significance level from the carbon assessment remains unchanged, namely that over the Scheme's full appraisal period, a minor carbon saving is expected when assessing whole-life carbon.
36. Despite the May 2025 (v2.01) TAG data book having increased electric vehicle uptake assumptions which tempers the result for carbon savings, the F-series forecasts estimate a greater reduction in vehicle kilometres associated with the Scheme. The Scheme is expected to reduce vehicle kilometres travelled.
37. In addition, an assessment of the F-series data using the May 2022 data book assumptions was also completed, which is presented in Andy Saunders' Appendix to his proof evidence [Appendix C] [CD26-01-APP-W3-2, PDF pages 17-24]. The assessment was completed because the assessment presented in the Environmental Statement used the same May 2022 TAG data book. This was to enable a better understanding and comparison of the revised results by providing a reference point between the assessment in the Environmental Statement and the update. The assessment using the F-series data and the May 2022 data book shows a significantly greater reduction in carbon resulting from the Scheme's implementation. This is explained below in paragraphs 75-77 - Magnitude of carbon impact between the E-series and the F-series.

Traffic modelling derived user emission calculation (AADT) in relation to the TAG data books and when and how they have been used

38. For the user carbon assessment derived from traffic modelling (AADT), on the 18th October 2022, the TAG data book in use was the May 2022 data book [v1.18] which was the latest version at the time of assessment. The November 2022 data book [v1.20.1] was not available until 30th November 2022.
39. While a 'Forthcoming changes' version was available, this was not formally in use and therefore not used as the basis for assessment because a 'Forthcoming changes' represents a possible future dataset rather than an active data book.
40. There is a difference in the fleet composition [Table A1.3.9] between the May 2022 and November 2022 data books. The May 2022 data book has more pessimistic electric vehicle uptake assumptions, meaning that the carbon savings assessed with this data book are greater than with later data books where faster uptake of electric vehicles tempers the carbon savings. See below Table 4 and Appendix A – Relevant TAG data book extracts.
41. The magnitude of the change which the carbon assessment estimated was aligned to the Scheme's expected benefits based on professional judgement, namely that the bus infrastructure would facilitate a beneficial impact on the network in carbon terms by reducing vehicle kilometres travelled.
42. The greatest level of electric vehicle uptake in the fleet proportions which might temper a scheme's estimated carbon savings came in the May 2025 TAG data book [v2.01]. Some information in this data book was provisionally available in the November 2024 'Forthcoming changes' version [v2.0FC-Nov-2024-v1.0] – see below in Appendix A - Relevant TAG data book extracts.
43. An updated assessment using the May 2025 data book has been provided from which the significance criteria of the overall assessment remain unchanged, i.e., the Scheme is expected result in a minor beneficial impact in carbon terms– see results below in Table 2 and in Andy Saunders' Appendix to his proof evidence [Appendix C] [CD26-01-APP-W3-2, PDF pages 17-24].

Modal shift in relation to the TAG data books and when and how they have been used

44. Following a carbon workshop in March 2023, it was agreed by the project team at the Greater Cambridge partnership and the carbon assessment team at WSP UK Ltd. that the default national active travel statistics were not applicable in Greater Cambridge where Active Travel is widespread, so locally derived data was applied. The modal shift assessment was updated to reflect this.
45. The modal shift assessment, prior to submission of the Environmental Statement [**CD1-10.01 Environmental Statement (ES Main Report)**] was originally completed using the same data book as the traffic modelling derived user emission assessment, namely the May 2022 data book (v1.18). Following the workshop and identifying that the modal shift assessment used active travel statistics which were not aligned to the scheme, the modal shift assessment was updated using the November 2022 data book (v1.20.1) which was the latest available at the time of assessment.

46. As confirmed above, the prior assessment of carbon associated with the traffic model (based on TAG data book May 2022) was not updated.
47. The Department for Transport's January 2014 guidance on proportionate update applies ([TAG TPM - The Proportionate Update Process](#)) Section 1.3 'The principles of proportionate updating', see Appendix B below. This guidance confirms that it is possible to have a TAG compliant assessment with an older version of the data book, providing updates are not ignored but are accounted for in a proportionate way. This acknowledges the rate at which the TAG data book is updated (see also paragraphs 8 and 33 above), as it may not be proportionate to update all assessments across a submission every six months, i.e., with the release of every new TAG data book.
48. This is why both the May 2022 data book and the November 2022 data book feature in the carbon assessment presented in the [Environmental Statement](#) [CD1-10.01 **Environmental Statement (ES Main Report)**] – the former is associated with the traffic model assessment and the latter with modal shift.
49. An update to the modal shift assessment using the latest TAG data book [May 2025, v2.01] has been provided – the results are available in [Andy Saunders' Appendix to his proof evidence](#) [Appendix C] [CD26-01-APP-W3-2, PDF pages 17-24]. It is based on a more recent version of the traffic model outputs and the significance criteria of the overall assessment remain unchanged.

Implications of methodology used to estimate impacts beyond the final modelled year

50. The estimated change in tonnes of carbon dioxide equivalent in the final modelled year for each assessment is presented in Table 1, below.

Table 1 – Final modelled year (traffic) estimated carbon impact

Modelling Series	TAG data book used in assessment	Final modelled year	Impact in final modelled year
E-series	May 2022 [V1.18]	2036	-456 tonnes carbon dioxide equivalent
F-series	May 2022 [V1.18]	2041	-991 tonnes carbon dioxide equivalent
F-series	May 2025 [V2.01]	2041	-546 tonnes carbon dioxide equivalent

51. In the original assessment, the carbon assessment result for the final modelled year (2036 for E-series, 2041 for F-series) was applied to every subsequent year up to the final year of the Scheme assessment (2085 for E-series assessment and 2087 for F-series assessment).
52. The original assessment methodology was considered best practice at the time in the absence of any specific guidance on estimating emissions beyond the final modelled year.
53. As all assessments using this original methodology show a reduction in carbon in the final modelled year, the effect of applying the final year result to all subsequent years is that adverse carbon impacts incurred during the construction phase are offset by user carbon

benefits over time. As such, this has at times during the Public Inquiry been referred to as 'linear recovery'.

54. This methodology also has the effect of compounding the differences between assessment results, as overall reductions over the assessment period are proportionate to the estimate of carbon reductions in the final modelled year.
55. With reference to the CPPF's second point in paragraph 4, the effect of linear recovery on emissions over the scheme's full life-cycle sets the different assessments (presented respectively in the Environmental Statement and Andy Saunder's Proof of Evidence Appendix C) on different trajectories which resulted in an increase from -30,960 tCO₂e to -56,915 tCO₂e when the data from the CSRMS was updated from the E-Series to the F-series.'
56. The graph below in Figure 2 illustrates this effect. For example, the change in the tonnes of carbon dioxide equivalent being greatest in the F-series assessment using the May 2022 TAG data book [v1.18] means that the cumulative change over time for this assessment is greater than the other assessments.
57. The impact of using the latest 2025 TAG data book [v2.01 - which has the most optimistic change in electric vehicle fleet assumptions compared to prior data books, see Appendix A - Relevant TAG data book extracts] is evident in the magnitude of difference between the estimated change in the two F-series assessments. This shows how a more rapidly decarbonising vehicle fleet tempers the benefits of the scheme.

New QCG Methodology – applying TAG data book assumptions for the year 2050

58. At the time of the original assessment submitted in the Environmental Statement [CD1-10.01 **Environmental Statement (ES Main Report)**], an alternative methodology for assessing carbon impacts beyond the second modelled year (other than applying the final year's result up to the end of the assessment period) was not specified in any guidance or methodology as standard practice.
59. Guidance on extrapolation beyond the final modelled year became available in August 2025 when the Department for Transport released their Quantifiable Carbon Reduction Guidance or 'QCG' [CD8-41 **paragraph 7.46**]: *"If the last modelled year is a long time (for example more than 5 years) from 2050, then a 2050 estimate for link flow and speeds should be produced by extrapolating the last modelled year's data and TAG Data Book 2050 data to capture the full extent of fleet composition changes published in the TAG Data Book."* For years beyond 2050, QCG [CD8-41 **paragraph 7.47**] suggests: "Data for appraisal years beyond 2050 can be held constant up to the end of the assessment period (extrapolated horizontally)."
60. An additional assessment, using this methodology prescribed in QCG, is available in Table 3.
61. In this assessment, 2041 traffic model forecast data has been used alongside TAG data book assumptions (e.g., electric vehicle percentage) for 2050 to produce an estimate of impacts in 2050. The 2050 emissions result is then assumed to remain constant for every subsequent year up to the final year of the scheme assessment.

62. This new QCG methodology accounts for fleet composition estimates up to 2050 (using the latest TAG data book, May 2025, v2.01), when electric vehicles are estimated to account for 82% of vehicle kilometres travelled.
63. Emissions for years between the two forecast years and between the final forecast year and 2050 have been linearly interpolated, and the 2050 emissions result is then assumed to remain constant for every subsequent year up to the final year of the scheme assessment as prescribed in QCG **[CD8-41 paragraph 7.47]**.
64. QCG **[CD8-41]** advises that data for appraisal years beyond 2050 can be held constant up to the end of the assessment period (see paragraph 7.47 in the guidance document). This is due to TAG Data book values for all relevant datasets (see Appendix A, below) not extending beyond 2050.
65. QCG **[CD8-41 paragraph 7.47]** also presents an alternative approach to estimating emissions beyond 2050: rather than applying the 2050 estimate of emissions to subsequent years in the assessment period, *“the annual change to extrapolating between the final two modelled years could be applied beyond the final modelled year if considered appropriate”*. This approach is not appropriate in this case because extrapolating the trend between 2041 and 2050 to the end of the assessment period would imply electric vehicle uptake exceeds 100% before the end of the assessment period, which is not possible.
66. Since the 2050 estimate of carbon impact has been calculated from 2041 model forecast data, the difference between 2041 and 2050 estimates of carbon impacts is only due to different TAG parameters being applied (reflective of the forecast year). It is therefore not appropriate to extrapolate the annual change between these years beyond 2050 as it would not reflect any changes in forecasts and would not accurately reflect future trends in TAG parameters. The trend in emissions between the modelled years, therefore, cannot be extrapolated beyond the years covered by TAG parameters (up to 2050).
67. It is likely that further electrification of the fleet will continue beyond 2050 (i.e., greater than 82% electric after 2050), however there is currently no estimate of electric vehicle uptake beyond 2050 available from the Department for Transport.
68. Table 2 shows the difference in results achieved when using the ‘Original Methodology’ and the ‘New QCG Methodology’.

Table 2– Estimated carbon impact beyond 2050 based on the TAG data book assumptions

TAG data book used in assessment	Extrapolation method	Electric vehicle fleet proportion in 2050	Carbon impact in final forecast year
May 2022 (v1.18)	Original methodology - Consistent from final modelled year in the traffic model (2041)	34% (2041 value)	-991 tonnes carbon dioxide equivalent
May 2025 (v2.01)	Original methodology - Consistent from final modelled year in the traffic model (2041)	75% (2041 value)	-546 tonnes carbon dioxide equivalent
May 2022 (v1.18)	New QCG Methodology - Accounts for data book fleet decarbonisation between 2041 and 2050	44%	-821 tonnes carbon dioxide equivalent
May 2025 (v2.01)	New QCG Methodology - Accounts for data book fleet decarbonisation between 2041 and 2050	82%	-412 tonnes carbon dioxide equivalent

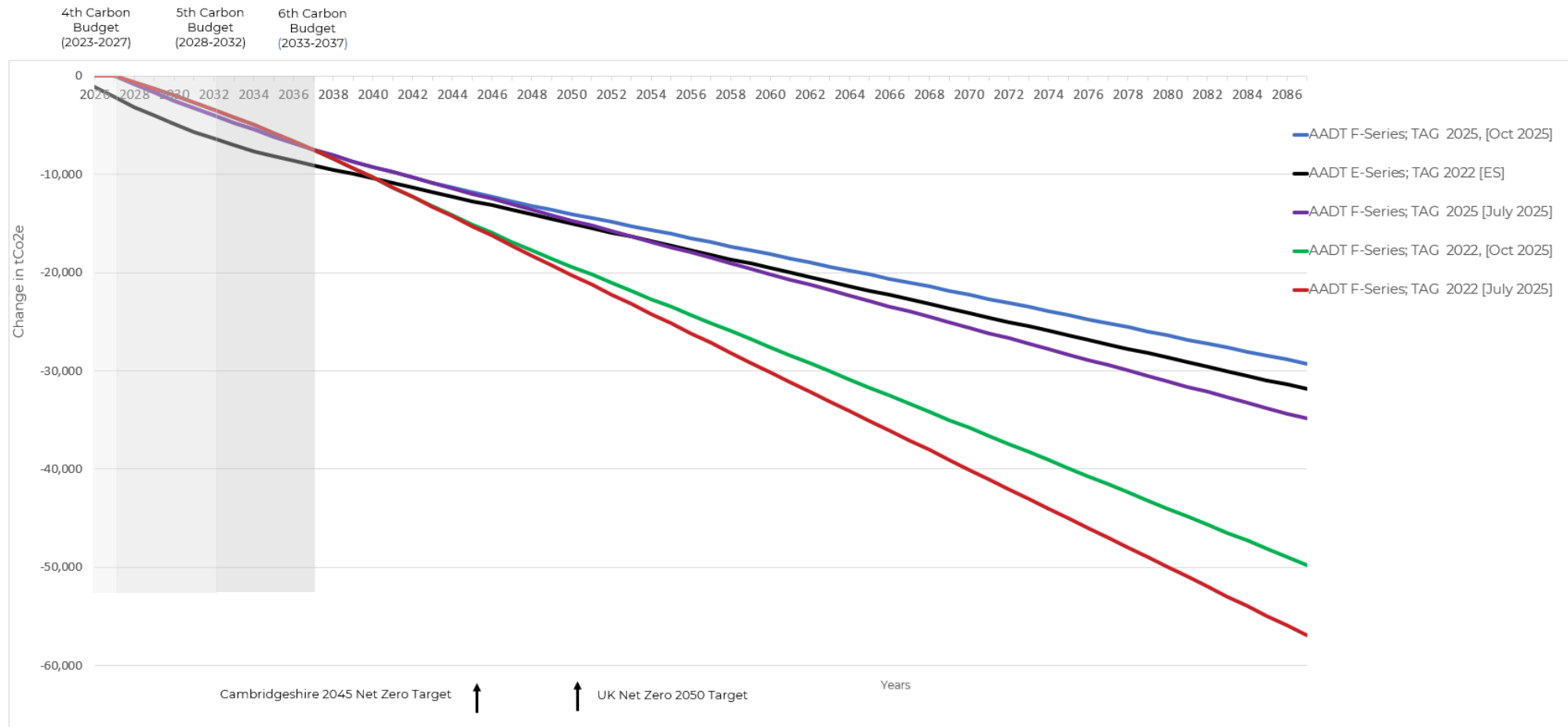
69. The effect of this on the Scheme's estimated net whole-life carbon impact is shown in Table 3 below.

Table 3 – Standard assessment results comparison (with updated labels for clarity and updated traffic modelling assessment methodology up to 2050)

Component of carbon assessment	Original assessment E-series TAG May 2022	July 2025 assessment F-series TAG May 2022 Original methodology	July 2025 assessment F-series TAG May 2025 Original methodology	October 2025 assessment F-series TAG May 2022 New QCG Methodology	October 2025 assessment F-series TAG May 2025 New QCG Methodology
Traffic modelling derived user emission calculation (based on Annual Average Daily Traffic (AADT))	-30,960 tCO ₂ e	-56,915 tCO ₂ e	-34,895 tCO ₂ e	-49,767 tCO ₂ e	-29,286 tCO ₂ e
Net Impact (including modal shift user carbon impacts, capital carbon, and vegetation impacts)	-5,020 tCO ₂ e	-30,491 tCO ₂ e	-7,055 tCO ₂ e	-23,342 tCO ₂ e	-1,446 tCO ₂ e
Carbon assessment period	2026-2085	2028-2087	2028-2087	2028-2087	2028-2087
Carbon payback period	2078	2058	2078	2059	2084

**Where tCO₂e equates to tonnes of carbon dioxide equivalent*

Figure 2 – Cumulative change in carbon emissions based on outputs from the traffic model: Annual Average Daily Traffic Flows (AADT)



- Blue - AADT F-series; TAG 2025, [Oct 2025] uses the new QCG methodology
- Black - AADT E-series; TAG 2022, [ES] refers to the assessment presented in [CD1-10.01 Environmental Statement (ES Main Report)]
- Purple - AADT F-series; TAG 2025, [July 2025] refers to the assessment presented in Appendix C of the Proof of Evidence of Andy Saunders [CD26-01-APP-W3-2])
- Green - AADT F-series; TAG 2022, [Oct 2025] uses the new QCG methodology
- Red - AADT F-series; TAG 2022, [July 2025] refers to the assessment presented in Appendix C of the Proof of Evidence of Andy Saunders [CD26-01-APP-W3-2])

70. The figure shows that the E-series TAG May 2022 assessment predicts greater savings earlier on, but these diminish more quickly which means that in the final modelled year, less carbon is avoided than the other scenarios (-456 CO₂e per annum – see Table 1). This adds up over the scheme's lifetime, resulting in fewer reductions relative to the F-series Data.
71. The F-series TAG May 2022 result predicts fewer carbon savings in the earliest years, but these savings improve over time rather than diminish. This means that the carbon savings in the final modelled year, which is the final figure applied to all subsequent years, are greater. This greater saving compounds/culminates over time leading to a greater magnitude of change over the full appraisal period.
72. The difference between the E-series TAG May 2022 and the F-series TAG May 2022 assessment is then tempered by the application of the TAG May 2025 to the F-series data. The electrification of the vehicle fleet in the May 2025 TAG data book [v2.01] is greater than in the May 2022 TAG data book [v1.18]. This has the effect of tempering estimated carbon reductions when using the May 2025 TAG book instead of the May 2022 data book (see Table 3 above).
73. When the new QCG methodology is applied, the reduction is again tempered due to accounting for further electric vehicle uptake to 2050.
74. Note that the significance of the scheme remains as reported in the Environmental Statement, regardless of the model data used (E-series or F-series), TAG version used, or methodology used.

Magnitude of carbon impact between the E-series and the F-series

75. During the Public Inquiry on Tuesday 23rd September 2025, Mr Andy Saunders was questioned as to why there was an increase from -30,960 tCO₂e (based on the E-series assessment presented in the Environmental Statement [CD1-10.01 **Environmental Statement (ES Main Report)**]) to -56,915 tCO₂e (based on the F-series assessment using TAG May 2022, as presented in Appendix C of the Proof of Evidence of Andy Saunders [CD26-01-APP-W3-2]) when the data from the Cambridge Sub-Regional Model (CSRM) was updated.
76. Fundamentally, the estimated carbon reductions from the 'F-series' model forecast are greater than 'E-series' model forecast because the F-Series forecasts greater reductions in vehicle kilometres associated with the scheme.
77. A secondary reason is that in the F-series model, there are greater reductions in vehicle kilometres in the final modelled year (2041) than in the scheme's opening year (2028), for which there is an associated carbon saving. This means that vehicle kilometre reductions increase over time. Therefore, the difference in the final figure for the annual change in carbon, as shown in Table 1 above, shows a greater change for the F-series assessment than the E-series assessment. This accumulates over time, causing the magnitude of difference between the E-Series and F-Series assessments.

How modal shift was accounted for in the carbon assessment

78. While the general traffic data is based on Annual Average Daily Traffic (AADT) flow outputs from the traffic modelling, which provides varied vehicle kilometres depending on

the link (i.e., road), modal shift is assessed using outputs from the bus forecasting and Active Mode Appraisal Toolkit (AMATs). These each provide a single annual change in vehicle kilometres.

79. User carbon impacts are estimated from these forecast vehicle kilometres changes. This is done using calculations involving Department for Transport TAG data book assumptions including changing fleet composition, fuel consumption and carbon factors.
80. Further information on this is provided in 'paragraphs 85-90 'Relevant TAG data book extracts' and 'Appendix A - Relevant TAG data book extracts'.

Clarity on table labelling from Andy Saunder's Appendices to the Proof of Evidence [CD26-01-APP-W3-2, PDF page 19]

81. In Andy Saunders' Appendices to the Proof of Evidence [CD26-01-APP-W3-2, PDF page 19], document, a table was presented named 'Table 1 – Standard assessment results comparison'. It is shown below in Figure 3.

Figure 3 – Extract from Andy Saunder's Appendices to the Proof of Evidence [CD26-01-APP-W3-2, PDF page 19, Table 1 in Andy Saunder's Proof of Evidence Appendix C]

<i>Table 1 – Standard assessment results comparison</i>				
	May 2023 Assessment	Updated assessment using TAG 2022	Updated assessment using TAG 2025	Difference (between May 2023 assessment and updated assessment using 2025 TAG Databook)
Changes in general traffic (AADT)	-30,960 tCO ₂ e	-56,915 tCO ₂ e	-34,895 tCO ₂ e	-3,935 tCO ₂ e
Modal shift to bus (Bus forecasting)	-4,500 tCO ₂ e	-4,315 tCO ₂ e	-2,290 tCO ₂ e	+2,210 tCO ₂ e
Modal shift to walking & cycling (AMAT)	-600 tCO ₂ e	-300 tCO ₂ e	-210 tCO ₂ e	+390 tCO ₂ e

82. The headings have been renamed for clarity to better distinguish between assessments. These are reflected in Table 3 above.
83. The former "Changes in general traffic (AADT)" shown in Figure 3 has been renamed to "Traffic modelling derived user emission calculation (Annual Average Daily Traffic (AADT))" to better reflect its purpose and results. This is to avoid any confusion regarding the Scheme's aims and is titled to reflect the fact that the figures are associated with outputs from the traffic model. The updated table, Table 2, is presented above.
84. The changed wording to "Traffic modelling derived user emission calculation (Annual Average Daily Traffic (AADT))" applies equally to 'Table 2' in Andy Saunders' Appendices to the Proof of Evidence [CD26-01-APP-W3-2, PDF page 19, Table 2 in Andy Saunder's Proof of Evidence Appendix C]. The second table, which showed the 'optimistic sensitivity test', has not been updated because it is not part of the core assessment.

Relevant TAG data book extracts

85. There are several datasets in the TAG databook that have been used in the carbon calculations. These are illustrated in Appendix A and listed below for ease of reference:
- a) A1.3.9 – [Fleet composition] ‘Proportion of cars, [light goods vehicles] LGVs & other vehicle kilometres using petrol, diesel or electricity’.
 - b) A1.3.11 – [Fuel parameters] ‘Forecast fuel consumption parameters’.
 - c) A3.3 – [Carbon emissions] ‘Carbon dioxide emissions per litre of fuel burnt / kWh used’.
86. Items are only shown from the TAG data books which feature in the carbon assessments to date, namely:
- a) May 2022 [v1.18]
 - b) November 2022 [v1.20.1]
 - c) May 2025 [v2.01]
87. With each iteration of the above TAG data books, the fleet composition has grown more optimistic towards the uptake of electric vehicles.
88. The May 2025 data book has the highest electric vehicle fleet composition and updated fuel parameters and carbon emissions, especially after 2030, to reflect the ZEV mandate which became legislation and therefore ‘firm and funded’ in January 2024.
89. Table 4 below shows the trend of electric vehicle fleet proportions between the respective TAG data books.

Table 4 - Electric vehicle fleet proportions between the respective TAG data books

Year	TAG May 2022 [v1.18]	TAG Nov 2022 [v1.20.1]	TAG May 2025 [v2.01]
2025	5%	15%	11%
2026 (OY)	7%	19%	14%
2028 (OY)	11%	27%	22%
2030	16%	36%	34%
2035	25%	52%	59%
2036 (E Y2)	27%	55%	62%
2040	33%	62%	73%
2041 (F Y2)	34%	63%	75%
2045	39%	66%	80%
2050	44%	67%	82%

*Labels in the first column refer to the Scheme Opening Year (“OY”) and the second modelled years in the traffic model, e.g., E-series second modelled year is “E Y2” and the F-series is “F Y2”.

90. For images of each relevant data book extract, see Appendix A below.

Summary and Conclusions

91. This note concludes that:

- The TAG data book versions used for the assessments in the Environment Statement is considered appropriate.
- Updating the TAG data book values would not result in a material change in the carbon significance rating of the Scheme reported in the Environmental Statement.
- The difference in carbon impact between E-Series and F-Series traffic model results can be explained by the difference in the change in vehicle kilometres travelled estimated by each model series. The F-series model shows much greater reductions in vehicle kilometres travelled, which translates to higher user emissions savings.
- Using QCG guidance (not available at the time of preparation and publication of the Environmental Statement) to forecast emissions beyond the final modelled year, tempers the emissions savings, but does not result in a material change in the carbon significance rating of the Scheme reported in the Environmental Statement.
- It is not appropriate in this case to extrapolate emissions changes beyond 2050 because extrapolating the trend between 2041 and 2050 to well beyond 2050 would imply electric vehicle uptake exceeds 100% before the end of the assessment period, which is not possible.

92. The results indicate that the Scheme is predicted to contribute to the avoidance of carbon emissions. The magnitude of the whole-life carbon impact result obtained in the July 2025 and October 2025 assessments remains unchanged from the result presented in the Environmental Statement.



Appendix A - Relevant TAG Data Book Extracts

A.1 For extracts of relevant sections from relevant TAG data books, see below.

TAG data book May 2022 [v1.18] Table A1.3.9 [Fleet Composition]



Department
for Transport

TAG Table A 1.3.9

Proportions of vehicle kilometres by fuel type

This version:

May 2022 v1.18

May-22

Links:

Contents

TAG Unit 3.5.6

TAG Unit A 1.3

Parameters:

Source year: 2010

Sheet Navigation:

Notes

Source: DfT, Environmental Analysis

Notes:

- (1) Values are assumed to be constant post 2050
- (2) These data are in line with the assumptions made for the road emissions component of BEIS's Energy and Emissions Projections, to be published this year. [Link to last EEP publication](#)
- (3) They represent the current Government policy reference scenario, meaning that they reflect all agreed policies where decisions on policy design are sufficiently advanced to allow robust estimates of impact (i.e. including "planned" policies)
- (4) Forecasts are based on DfT's internal fleet model, produced by the Environmental analysis team.
- (5) At present, it is assumed there are no OGVs or PSVs using electricity. These columns are for possible future use. [Link to traffic stats definitions](#)
- (6) OGV 1 comprises rigid's up to 26 tonnes, whereas OGV 2 comprises rigid's over 26 tonnes, and artic's. Rigid's and artic's are as defined in the DfT Traffic Statistics.

Data Book Source worksheets: VoC Mileage %. This table feeds into Tables A 1.3.12, A 1.3.13 and A 1.3.15.

TAG 1: Unit 3.5.6 (Table 12)

Table A 1.3.9: Proportion of cars, LGV & other vehicle kilometres using petrol, diesel or electricity												
Year	Cars			LGV			OGV1		OGV2		PSV	
	Petrol	Diesel	Electric	Petrol	Diesel	Electric	Diesel	Electric	Diesel	Electric	Diesel	Electric
2004	73%	27%	0%	8%	92%	0%	100%	0%	100%	0%	100%	0%
2005	71%	29%	0%	7%	93%	0%	100%	0%	100%	0%	100%	0%
2006	68%	32%	0%	6%	94%	0%	100%	0%	100%	0%	100%	0%
2007	66%	34%	0%	5%	95%	0%	100%	0%	100%	0%	100%	0%
2008	64%	36%	0%	4%	96%	0%	100%	0%	100%	0%	100%	0%
2009	62%	38%	0%	4%	96%	0%	100%	0%	100%	0%	100%	0%
2010	60%	40%	0%	3%	96%	0%	100%	0%	100%	0%	100%	0%
2011	58%	42%	0%	3%	97%	0%	100%	0%	100%	0%	100%	0%
2012	55%	45%	0%	3%	97%	0%	100%	0%	100%	0%	100%	0%
2013	53%	47%	0%	3%	97%	0%	100%	0%	100%	0%	100%	0%
2014	51%	48%	0%	2%	97%	0%	100%	0%	100%	0%	100%	0%
2015	50%	50%	0%	2%	98%	0%	100%	0%	100%	0%	100%	0%
2016	48%	51%	0%	2%	98%	0%	100%	0%	100%	0%	100%	0%
2017	48%	52%	0%	2%	98%	0%	100%	0%	100%	0%	100%	0%
2018	49%	51%	1%	2%	98%	0%	100%	0%	100%	0%	100%	0%
2019	49%	50%	1%	2%	98%	0%	100%	0%	100%	0%	100%	0%
2020	50%	49%	1%	2%	98%	0%	100%	0%	100%	0%	100%	0%
2021	51%	48%	1%	2%	98%	0%	100%	0%	100%	0%	100%	0%
2022	52%	46%	2%	2%	98%	0%	100%	0%	100%	0%	100%	0%
2023	53%	45%	3%	2%	97%	1%	100%	0%	100%	0%	100%	0%
2024	53%	43%	4%	2%	97%	1%	100%	0%	100%	0%	100%	0%
2025	53%	41%	5%	2%	97%	1%	100%	0%	100%	0%	100%	0%
2026	53%	39%	7%	2%	96%	1%	100%	0%	100%	0%	100%	0%
2027	53%	38%	9%	2%	96%	2%	100%	0%	100%	0%	100%	0%
2028	53%	36%	11%	2%	95%	2%	100%	0%	100%	0%	100%	0%
2029	53%	34%	13%	3%	94%	3%	100%	0%	100%	0%	100%	0%
2030	52%	32%	16%	3%	94%	4%	100%	0%	100%	0%	100%	0%
2031	51%	31%	18%	3%	93%	4%	100%	0%	100%	0%	100%	0%
2032	51%	29%	20%	3%	92%	5%	100%	0%	100%	0%	100%	0%
2033	50%	28%	22%	3%	91%	6%	100%	0%	100%	0%	100%	0%
2034	49%	27%	24%	3%	90%	7%	100%	0%	100%	0%	100%	0%
2035	48%	26%	25%	3%	89%	8%	100%	0%	100%	0%	100%	0%
2036	47%	26%	27%	3%	88%	9%	100%	0%	100%	0%	100%	0%
2037	46%	25%	29%	4%	87%	10%	100%	0%	100%	0%	100%	0%
2038	46%	24%	30%	4%	86%	11%	100%	0%	100%	0%	100%	0%
2039	45%	24%	32%	4%	85%	12%	100%	0%	100%	0%	100%	0%
2040	44%	23%	33%	4%	84%	12%	100%	0%	100%	0%	100%	0%
2041	43%	23%	34%	4%	83%	13%	100%	0%	100%	0%	100%	0%
2042	42%	22%	36%	4%	82%	14%	100%	0%	100%	0%	100%	0%
2043	41%	22%	37%	4%	81%	15%	100%	0%	100%	0%	100%	0%
2044	41%	21%	38%	4%	80%	16%	100%	0%	100%	0%	100%	0%
2045	40%	21%	39%	4%	79%	17%	100%	0%	100%	0%	100%	0%
2046	39%	20%	40%	4%	78%	18%	100%	0%	100%	0%	100%	0%
2047	39%	20%	41%	5%	77%	19%	100%	0%	100%	0%	100%	0%
2048	38%	20%	42%	5%	76%	19%	100%	0%	100%	0%	100%	0%
2049	37%	19%	43%	5%	75%	20%	100%	0%	100%	0%	100%	0%
2050	37%	19%	44%	5%	74%	21%	100%	0%	100%	0%	100%	0%

TAG data book November 2022 [v1.20.1] Table A1.3.9 [Fleet Composition]



Department
for Transport

TAG Table A 1.3.9

Proportions of vehicle kilometres by fuel type

This version:

November 2022 v1.20.1
Nov-22

Links:

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TAG Unit 3.5.6
TAG Unit A 1.3

Parameters:

Source year: 2010

Sheet Navigation:

Notes

Source: DfT, Environmental Analysis

Notes:

- (1) Values are assumed to be constant post 2050
- (2) These data will provide the basis for the fleet assumptions used in the 2021-2040 Energy and Emissions Projections (due to be published by BEIS in 2022) [Link to last EEP publication](#)
- (3) They represent the current Government policy reference scenario, meaning that they reflect all agreed policies where decisions on policy design are sufficiently advanced to allow robust estimates of impact (i.e. including "planned" policies)
- (4) Forecasts are based on DfT's internal fleet model, produced by the Environmental Analysis team.
- (5) At present, it is assumed there are no OGVs using electricity. These columns are for possible future use.
- (6) OGV 1 comprises rigid up to 26 tonnes, whereas OGV 2 comprises rigid over 26 tonnes, and artic. Rigid and artic are as defined in the DfT Traffic Statistics. [Link to traffic stats definitions](#)

Data Book Source worksheets: VoC Mileage %. This table feeds into Tables A 1.3.12, A 1.3.13 and A 1.3.15.

TAG 1: Unit 3.5.6 (Table 12)

Table A 1.3.9: Proportion of cars, LGV & other vehicle kilometres using petrol, diesel or electricity												
Year	Cars			LGV			OGV1		OGV2		PSV	
	Petrol	Diesel	Electric	Petrol	Diesel	Electric	Diesel	Electric	Diesel	Electric	Diesel	Electric
2004	73%	27%	0%	8%	92%	0%	100%	0%	100%	0%	100%	0%
2005	71%	29%	0%	7%	93%	0%	100%	0%	100%	0%	100%	0%
2006	68%	32%	0%	6%	94%	0%	100%	0%	100%	0%	100%	0%
2007	66%	34%	0%	5%	95%	0%	100%	0%	100%	0%	100%	0%
2008	64%	36%	0%	4%	96%	0%	100%	0%	100%	0%	100%	0%
2009	62%	38%	0%	4%	96%	0%	100%	0%	100%	0%	100%	0%
2010	60%	40%	0%	3%	96%	0%	100%	0%	100%	0%	100%	0%
2011	58%	42%	0%	3%	97%	0%	100%	0%	100%	0%	100%	0%
2012	56%	44%	0%	3%	97%	0%	100%	0%	100%	0%	100%	0%
2013	54%	46%	0%	3%	97%	0%	100%	0%	100%	0%	100%	0%
2014	52%	48%	0%	2%	97%	0%	100%	0%	100%	0%	100%	0%
2015	50%	50%	0%	2%	98%	0%	100%	0%	100%	0%	100%	0%
2016	49%	51%	0%	2%	98%	0%	100%	0%	100%	0%	100%	0%
2017	48%	51%	0%	2%	98%	0%	100%	0%	100%	0%	100%	0%
2018	49%	51%	1%	2%	98%	0%	100%	0%	100%	0%	99%	1%
2019	49%	49%	1%	2%	98%	0%	100%	0%	100%	0%	99%	1%
2020	51%	48%	1%	2%	97%	1%	100%	0%	100%	0%	99%	1%
2021	52%	46%	3%	2%	97%	1%	100%	0%	100%	0%	98%	2%
2022	52%	43%	5%	2%	97%	1%	100%	0%	100%	0%	94%	6%
2023	51%	41%	7%	2%	97%	1%	100%	0%	100%	0%	89%	11%
2024	51%	39%	11%	2%	97%	1%	100%	0%	100%	0%	87%	13%
2025	50%	36%	15%	2%	96%	2%	100%	0%	100%	0%	84%	16%
2026	48%	33%	19%	2%	96%	2%	100%	0%	100%	0%	82%	18%
2027	47%	30%	23%	2%	96%	2%	100%	0%	100%	0%	79%	21%
2028	45%	27%	27%	2%	95%	3%	100%	0%	100%	0%	76%	24%
2029	44%	25%	32%	2%	95%	4%	100%	0%	100%	0%	73%	27%
2030	42%	22%	36%	2%	94%	5%	100%	0%	100%	0%	72%	28%
2031	40%	20%	40%	2%	92%	6%	100%	0%	100%	0%	71%	29%
2032	39%	18%	43%	2%	90%	8%	100%	0%	100%	0%	71%	29%
2033	37%	16%	47%	2%	88%	10%	100%	0%	100%	0%	70%	30%
2034	36%	15%	50%	2%	85%	13%	100%	0%	100%	0%	70%	30%
2035	34%	13%	52%	2%	83%	16%	100%	0%	100%	0%	70%	30%
2036	33%	12%	55%	2%	80%	19%	100%	0%	100%	0%	70%	30%
2037	31%	12%	57%	1%	77%	22%	100%	0%	100%	0%	70%	30%
2038	30%	11%	59%	1%	74%	24%	100%	0%	100%	0%	70%	30%
2039	29%	10%	60%	1%	72%	27%	100%	0%	100%	0%	70%	30%
2040	28%	10%	62%	1%	69%	29%	100%	0%	100%	0%	69%	31%
2041	28%	9%	63%	1%	68%	31%	100%	0%	100%	0%	69%	31%
2042	27%	9%	64%	1%	66%	33%	100%	0%	100%	0%	69%	31%
2043	27%	9%	64%	1%	64%	35%	100%	0%	100%	0%	68%	32%
2044	26%	9%	65%	1%	62%	37%	100%	0%	100%	0%	68%	32%
2045	26%	9%	66%	1%	60%	38%	100%	0%	100%	0%	68%	32%
2046	25%	8%	66%	1%	59%	40%	100%	0%	100%	0%	67%	33%
2047	25%	8%	67%	1%	58%	41%	100%	0%	100%	0%	67%	33%
2048	25%	8%	67%	1%	57%	42%	100%	0%	100%	0%	67%	33%
2049	25%	8%	67%	1%	55%	44%	100%	0%	100%	0%	67%	33%
2050	24%	8%	67%	1%	55%	45%	100%	0%	100%	0%	67%	33%

TAG data book May 2022 [v2.01] Table A1.3.9 [Fleet Composition]



Department
for Transport

TAG Table A 1.3.9

Proportions of vehicle kilometres by fuel type

This version:
May 2025 v2.01
May-25

Links:
Contents
TAG Unit 3.5.6
TAG Unit A 1.3

Parameters:

Source year: 2024

Sheet Navigation:

Notes

Source: DfT, Environmental Analysis

Notes:

- (1) Values are assumed to be constant post 2050
- (2) They represent the current Government policy reference scenario, meaning that they reflect all agreed policies where decisions on policy design are sufficiently advanced to allow robust estimates of impact (i.e. including "planned" policies)
- (3) Forecasts are based on DfT's internal fleet model, produced by the Environmental Analysis team.
- (4) At present, it is assumed there are no OGVs using electricity. These columns are for possible future use.
- (5) OGV 1 comprises rigids up to 26 tonnes, whereas OGV 2 comprises rigids over 26 tonnes, and artics. Rigids and artics are as defined in the DfT Traffic Statistics.

[Link to traffic stats definitions](#)

Data Book Source worksheets: VoC Mileage %. This table feeds into Tables A 1.3.12, A 1.3.13 and A 1.3.15.
TAG 1: Unit 3.5.6 (Table 12)

Table A 1.3.9: Proportion of cars, LGV & other vehicle kilometres using petrol, diesel or electricity												
Year	Cars			LGV			OGV1		OGV2		PSV	
	Petrol	Diesel	Electric	Petrol	Diesel	Electric	Diesel	Electric	Diesel	Electric	Diesel	Electric
2004	73%	27%	0%	8%	92%	0%	100%	0%	100%	0%	100%	0%
2005	71%	29%	0%	7%	93%	0%	100%	0%	100%	0%	100%	0%
2006	68%	32%	0%	6%	94%	0%	100%	0%	100%	0%	100%	0%
2007	66%	34%	0%	5%	95%	0%	100%	0%	100%	0%	100%	0%
2008	64%	36%	0%	4%	96%	0%	100%	0%	100%	0%	100%	0%
2009	62%	38%	0%	4%	96%	0%	100%	0%	100%	0%	100%	0%
2010	60%	40%	0%	3%	96%	0%	100%	0%	100%	0%	100%	0%
2011	58%	42%	0%	3%	97%	0%	100%	0%	100%	0%	100%	0%
2012	56%	44%	0%	3%	97%	0%	100%	0%	100%	0%	100%	0%
2013	54%	46%	0%	3%	97%	0%	100%	0%	100%	0%	100%	0%
2014	52%	48%	0%	2%	97%	0%	100%	0%	100%	0%	100%	0%
2015	50%	50%	0%	2%	98%	0%	100%	0%	100%	0%	100%	0%
2016	49%	51%	0%	2%	98%	0%	100%	0%	100%	0%	100%	0%
2017	48%	51%	0%	2%	98%	0%	100%	0%	100%	0%	100%	0%
2018	49%	51%	0%	2%	98%	0%	100%	0%	100%	0%	99%	1%
2019	50%	49%	1%	2%	98%	0%	100%	0%	100%	0%	99%	1%
2020	51%	48%	1%	2%	97%	0%	100%	0%	100%	0%	99%	1%
2021	52%	46%	2%	2%	97%	1%	100%	0%	100%	0%	98%	2%
2022	53%	43%	3%	2%	96%	2%	100%	0%	100%	0%	97%	3%
2023	54%	40%	6%	2%	96%	2%	100%	0%	100%	0%	94%	6%
2024	54%	37%	9%	2%	95%	3%	100%	0%	100%	0%	92%	8%
2025	54%	35%	11%	2%	93%	5%	100%	0%	100%	0%	90%	10%
2026	54%	32%	14%	2%	91%	7%	100%	0%	100%	0%	88%	12%
2027	54%	29%	17%	2%	88%	10%	100%	0%	100%	0%	87%	13%
2028	53%	26%	22%	2%	84%	14%	100%	0%	100%	0%	86%	14%
2029	50%	22%	27%	2%	79%	19%	100%	0%	100%	0%	86%	14%
2030	47%	19%	34%	2%	73%	26%	100%	0%	100%	0%	85%	15%
2031	44%	17%	40%	1%	67%	31%	100%	0%	100%	0%	85%	15%
2032	41%	14%	45%	1%	63%	36%	100%	0%	100%	0%	84%	16%
2033	38%	12%	50%	1%	59%	40%	100%	0%	100%	0%	84%	16%
2034	35%	10%	55%	1%	55%	44%	100%	0%	100%	0%	84%	16%
2035	32%	9%	59%	1%	52%	47%	100%	0%	100%	0%	84%	16%
2036	30%	8%	62%	1%	49%	50%	100%	0%	100%	0%	84%	16%
2037	28%	7%	65%	1%	46%	53%	100%	0%	100%	0%	84%	16%
2038	26%	6%	68%	1%	44%	55%	100%	0%	100%	0%	84%	16%
2039	24%	5%	71%	1%	42%	57%	100%	0%	100%	0%	84%	16%
2040	22%	5%	73%	1%	40%	59%	100%	0%	100%	0%	85%	15%
2041	20%	4%	75%	1%	39%	60%	100%	0%	100%	0%	85%	15%
2042	19%	4%	77%	1%	38%	61%	100%	0%	100%	0%	85%	15%
2043	18%	4%	78%	1%	37%	62%	100%	0%	100%	0%	85%	15%
2044	17%	4%	79%	1%	36%	63%	100%	0%	100%	0%	86%	14%
2045	16%	3%	80%	1%	35%	64%	100%	0%	100%	0%	86%	14%
2046	16%	3%	81%	1%	35%	64%	100%	0%	100%	0%	86%	14%
2047	16%	3%	81%	1%	35%	65%	100%	0%	100%	0%	86%	14%
2048	15%	3%	82%	1%	34%	65%	100%	0%	100%	0%	86%	14%
2049	15%	3%	82%	1%	34%	65%	100%	0%	100%	0%	86%	14%
2050	15%	3%	82%	1%	34%	66%	100%	0%	100%	0%	86%	14%

TAG data book May 2022 [v1.18] Table A1.3.11 [Fuel Parameters]

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TAG Table A 1.3.11

Forecast fuel consumption parameters

This version:		Notes	
May 2022 v1.18		¹ Electric cars are treated as not existing before 2011. Fuel consumption is estimated using a function of the form: $L = aV + b + c.V + d.V^2$ Where: L = consumption, expressed in litres per kilometre; v = average speed in kilometres per hour; and a, b, c, d are parameters defined for each vehicle category.	
Links:			
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Initial fc year:		Forecast fuel consumption parameters are calculated from the source year parameters and the cumulative fuel efficiency factors for each year.	
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TAG data book November 2022 [v1.20.1] Table A1.3.9 [Fleet Composition]

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TAG Table A 1.3.11

Forecast fuel consumption parameters

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Cars	LGVs	
OGVs	PSVs	

Electric cars are treated as not existing before 2011.
Fuel consumption is estimated using a function of the form: $L = a \cdot v + b \cdot v^2 + c \cdot v^3 + d \cdot v^4$
Where:
L = consumption, expressed in litres per kilometre;
v = average speed in kilometres per hour; and
a, b, c, d are parameters defined for each vehicle category.

Forecast fuel consumption parameters are calculated from the source year parameters and the cumulative fuel efficiency factors for each year.

This feeds into Table A 1.3.12
Data Book source worksheets: Fuel consumption and A 1.3.10
TAG 1: Unit 3.5.6 (Table 10)

Table A 1.11:		Forecast fuel / energy consumption parameter values (2010 - 2089)																																							
Vehicle Category	Year	Petrol Car				Diesel Car				Electric Car ^c				Petrol LGV				Diesel LGV				Electric LGV				GVG1 (Diesel)				GVG2 (Diesel)				PSV (Diesel)				PSV (Electric)			
		a	b	c	d	a	b	c	d	a	b	c	d	a	b	c	d	a	b	c	d	a	b	c	d	a	b	c	d	a	b	c	d								
2010	2010	0.46664	0.09917	-0.00113	0.00007	0.50504	0.07241	-0.00070	0.00005	0.22466				0.351810	0.197275	-0.003097	0.000020	0.468227	0.114437	-0.001651	0.000014	0.257076				2.603021	0.138157	-0.000909	0.000011	5.727692	0.297440	-0.001971	0.000012	3.335007	0.290337	-0.003185	0.000023	1.170984			
2011	2011	0.46355	0.09851	-0.00112	0.00007	0.50091	0.07182	-0.00069	0.00005	0.22471				0.352143	0.197461	-0.003099	0.000020	0.465776	0.114277	-0.001649	0.000014	0.257076				2.603021	0.138157	-0.000909	0.000011	5.727692	0.297440	-0.001971	0.000012	3.335007	0.290337	-0.003185	0.000023	1.170984			
2012	2012	0.46973	0.09770	-0.00111	0.00007	0.49652	0.07119	-0.00068	0.00005	0.22381				0.352404	0.197608	-0.003102	0.000020	0.465769	0.114277	-0.001649	0.000014	0.257076				2.603021	0.138157	-0.000909	0.000011	5.727692	0.297440	-0.001971	0.000012	3.335007	0.290337	-0.003185	0.000023	1.170984			
2013	2013	0.45497	0.09669	-0.00110	0.00007	0.49186	0.07052	-0.00068	0.00005	0.22355				0.351776	0.197256	-0.003096	0.000020	0.465769	0.114277	-0.001649	0.000014	0.257076				2.603021	0.138157	-0.000909	0.000011	5.727692	0.297440	-0.001971	0.000012	3.335007	0.290337	-0.003185	0.000023	1.170984			
2014	2014	0.45768	0.09726	-0.00111	0.00007	0.48835	0.07002	-0.00067	0.00005	0.22197				0.353218	0.198064	-0.003109	0.000020	0.465769	0.114277	-0.001649	0.000014	0.257076				2.603021	0.138157	-0.000909	0.000011	5.727692	0.297440	-0.001971	0.000012	3.335007	0.290337	-0.003185	0.000023	1.170984			
2015	2015	0.45195	0.09605	-0.00109	0.00007	0.48191	0.06909	-0.00066	0.00005	0.22066				0.344348	0.193909	-0.003031	0.000020	0.463485	0.113278	-0.001634	0.000014	0.259603				2.603021	0.138157	-0.000909	0.000011	5.727692	0.297440	-0.001971	0.000012	3.335007	0.290337	-0.003185	0.000023	1.170984			
2016	2016	0.44574	0.09473	-0.00108	0.00007	0.47611	0.06826	-0.00066	0.00005	0.21973				0.344751	0.193764	-0.003023	0.000020	0.460225	0.113281	-0.001623	0.000014	0.259603				2.603021	0.138157	-0.000909	0.000011	5.727692	0.297440	-0.001971	0.000012	3.335007	0.290337	-0.003185	0.000023	1.170984			
2017	2017	0.44023	0.09356	-0.00107	0.00007	0.47241	0.06773	-0.00065	0.00005	0.21944				0.339126	0.190162	-0.002985	0.000019	0.460225	0.113281	-0.001623	0.000014	0.259603				2.603021	0.138157	-0.000909	0.000011	5.727692	0.297440	-0.001971	0.000012	3.335007	0.290337	-0.003185	0.000023	1.170984			
2018	2018	0.43589	0.09263	-0.00106	0.00007	0.47213	0.06769	-0.00065	0.00005	0.21924				0.328729	0.184332	-0.002893	0.000019	0.450512	0.110107	-0.001586	0.000013	0.260710				2.603021	0.138157	-0.000909	0.000011	5.727692	0.297440	-0.001971	0.000012	3.335007	0.290337	-0.003185	0.000023	1.170984			
2019	2019	0.43316	0.09205	-0.00105	0.00007	0.47364	0.06791	-0.00065	0.00005	0.22000				0.324987	0.182234	-0.002860	0.000018	0.447180	0.109293	-0.001577	0.000013	0.260710				2.603021	0.138157	-0.000909	0.000011	5.727692	0.297440	-0.001971	0.000012	3.335007	0.290337	-0.003185	0.000023	1.170984			
2020	2020	0.42914	0.09120	-0.00104	0.00007	0.47408	0.06797	-0.00065	0.00005	0.22128				0.318807	0.176769	-0.002806	0.000018	0.445518	0.108886	-0.001571	0.000013	0.261335				2.603021	0.138157	-0.000909	0.000011	5.727692	0.297440	-0.001971	0.000012	3.335007	0.290337	-0.003185	0.000023	1.170984			
2021	2021	0.42413	0.09013	-0.00103	0.00007	0.47414	0.06798	-0.00065	0.00005	0.21379				0.310841	0.174302	-0.002736	0.000018	0.445518	0.108886	-0.001571	0.000013	0.261335				2.603021	0.138157	-0.000909	0.000011	5.727692	0.297440	-0.001971	0.000012	3.335007	0.290337	-0.003185	0.000023	1.170984			
2022	2022	0.42767	0.09089	-0.00104	0.00007	0.47411	0.06798	-0.00065	0.00005	0.20552				0.307462	0.166799	-0.002618	0.000017	0.436629	0.106714	-0.001540	0.000013	0.260310				2.603021	0.138157	-0.000909	0.000011	5.727692	0.297440	-0.001971	0.000012	3.335007	0.290337	-0.003185	0.000023	1.170984			
2023	2023	0.42415	0.09014	-0.00103	0.00007	0.47424	0.06799	-0.00065	0.00005	0.19950				0.291122	0.163244	-0.002562	0.000017	0.433480	0.105944	-0.001528	0.000013	0.259052				2.603021	0.138157	-0.000909	0.000011	5.727692	0.297440	-0.001971	0.000012	3.335007	0.290337	-0.003185	0.000023	1.170984			
2024	2024	0.42163	0.08960	-0.00102	0.00007	0.47450	0.06803	-0.00065	0.00005	0.19532				0.286118	0.159876	-0.002510	0.000016	0.430654	0.105229	-0.001518	0.000013	0.258684				2.603021	0.138157	-0.000909	0.000011	5.727692	0.297440	-0.001971	0.000012	3.335007	0.290337	-0.003185	0.000023	1.170984			
2025	2025	0.42023	0.08930	-0.00102	0.00007	0.47485	0.06808	-0.00065	0.00005	0.19175				0.280917	0.157450	-0.002462	0.000016	0.428012	0.104629	-0.001509	0.000013	0.257442				2.603021	0.138157	-0.000909	0.000011	5.727692	0.297440	-0.001971	0.000012	3.335007	0.290337	-0.003185	0.000023	1.170984			
2026	2026	0.41923	0.08899	-0.00101	0.00007	0.47539	0.06816	-0.00066	0.00005	0.18896				0.275014	0.155688	-0.002431	0.000015	0.417178	0.101960	-0.001471	0.000012	0.255963				2.603021	0.138157	-0.000909	0.000011	5.727692	0.297440	-0.001971	0.000012	3.335007	0.290337	-0.003185	0.000023	1.170984			
2027	2027	0.41856	0.08895	-0.00101	0.00007	0.47615	0.06827	-0.00066	0.00005	0.18645				0.268297	0.144838	-0.002423	0.000015	0.415505	0.100574	-0.001451	0.000012	0.254643				2.603021	0.138157	-0.000909	0.000011	5.727692	0.297440	-0.001971	0.000012	3.335007	0.290337	-0.003185	0.000023	1.170984			
2028	2028	0.41819	0.08887	-0.00101	0.00007	0.47717	0.06842	-0.00066	0.00005	0.18419				0.262586	0.141788	-0.002426	0.000014	0.409417	0.099330	-0.001433	0.000012	0.253222				2.603021	0.138157	-0.000909	0.000011	5.727692	0.297440	-0.001971	0.000012	3.335007	0.290337	-0.003185	0.000023	1.170984			
2029	2029	0.41809	0.08885	-0.00101	0.00007	0.47853	0.06861	-0.00066	0.00005	0.18201				0.256169	0.139177	-0.002414	0.000014	0.406812	0.098176	-0.001421	0.000012	0.252014				2.603021	0.138157	-0.000909	0.000011	5.727692	0.297440	-0.001971	0.000012	3.335007	0.290337	-0.003185	0.000023	1.170984			
2030	2030	0.41800	0.08883	-0.00101	0.00007	0.48028	0.06886	-0.00066	0.00005	0.17997				0.250822	0.135185	-0.002422	0.000014	0.403431	0.096058	-0.001386	0.000012	0.251350				2.603021	0.138157	-0.000909	0.000011	5.727692	0.297440	-0.001971	0.000012	3.335007	0.290337	-0.003185	0.000023	1.170984			
2031	2031	0.41820	0.08889	-0.00101	0.00007	0.48202	0.06911	-0.00066	0.00005	0.17824				0.249033	0.135101	-0.002421	0.000014	0.403431	0.096058	-0.001386	0.000012	0.251350				2.603021	0.138157	-0.000909	0.000011	5.727692	0.297440	-0.001971	0.000012	3.335007	0.290337	-0.003185	0.000023	1.170984			
2032	2032	0.41873	0.08899	-0.00101	0.00007	0.48385	0.06937	-0.00067	0.00005	0.17671				0.245902	0.131719	-0.002408	0.000013	0.378418	0.094056	-0.001357	0.000011	0.250663				2.603021	0.138157	-0.000909	0.000011	5.727692	0.297440	-0.001971	0.000012	3.335007	0.290337	-0.003185	0.000023	1.170984			
2033	2033	0.41922	0.08909	-0.00101	0.00007	0.48572	0.06964	-0.00067	0.00005	0.17531				0.242911	0.127816	-0.002397	0.0																								

TAG data book May 2022 [v1.18] Table A3.3 [Carbon Emissions]



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TAG Table A 3.3 Carbon Emissions

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YAG Unit A 3

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2010

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Notes

Source: BEIS, 2021 Tables 1 (electricity emission factors) and 2b (converting road and rail fuels to CO2e emission factors)

Notes:

- (1) Roads emissions factors are taken from the long-run marginal 'Domestic' series.
- (2) Rail emissions factors are based on long-run marginal 'Generation-based' series, plus a mark-up of 1.5% to account for transmission losses.
- (3) Liquid fuel emissions factors include non-carbon GHG and account for forecast biofuel blending rates.
- (4) Petrol, diesel and gas oil emissions factors are assumed by BEIS to be flat post-2030
- (5) Electricity emissions factors are assumed by BEIS to be flat post-2050

This feeds Table A 3.3, Electricity and VoC Fuel

TAG 1: Unit 3.3.5 (Table 1)

Table A 3.3: Carbon dioxide emissions per litre of fuel burnt / kWh used					
Year	Petrol Kg CO2e/l	Diesel Kg CO2e/l	Gas Oil Kg CO2e/l	Electricity Roads Kg CO2e/kwh	Electricity Rail Kg CO2e/kwh
2010	2.230	2.562	2.926	0.389	0.363
2011	2.211	2.567	2.926	0.384	0.356
2012	2.211	2.609	2.926	0.377	0.348
2013	2.201	2.597	2.852	0.367	0.341
2014	2.189	2.601	2.856	0.360	0.333
2015	2.189	2.601	2.856	0.350	0.324
2016	2.189	2.602	2.856	0.340	0.315
2017	2.160	2.556	2.809	0.330	0.306
2018	2.130	2.511	2.763	0.319	0.296
2019	2.100	2.465	2.716	0.308	0.285
2020	2.071	2.420	2.669	0.296	0.274
2021	2.071	2.420	2.669	0.283	0.262
2022	2.071	2.420	2.669	0.269	0.250
2023	2.071	2.420	2.669	0.255	0.236
2024	2.071	2.420	2.669	0.240	0.222
2025	2.071	2.420	2.669	0.224	0.208
2026	2.071	2.420	2.669	0.207	0.192
2027	2.071	2.420	2.669	0.189	0.175
2028	2.071	2.420	2.669	0.171	0.158
2029	2.071	2.420	2.669	0.151	0.140
2030	2.071	2.420	2.669	0.130	0.120
2031	2.071	2.420	2.669	0.105	0.097
2032	2.071	2.420	2.669	0.085	0.079
2033	2.071	2.420	2.669	0.069	0.064
2034	2.071	2.420	2.669	0.056	0.052
2035	2.071	2.420	2.669	0.045	0.042
2036	2.071	2.420	2.669	0.036	0.034
2037	2.071	2.420	2.669	0.029	0.027
2038	2.071	2.420	2.669	0.024	0.022
2039	2.071	2.420	2.669	0.019	0.018
2040	2.071	2.420	2.669	0.016	0.014
2041	2.071	2.420	2.669	0.013	0.012
2042	2.071	2.420	2.669	0.012	0.011
2043	2.071	2.420	2.669	0.012	0.011
2044	2.071	2.420	2.669	0.011	0.010
2045	2.071	2.420	2.669	0.010	0.009
2046	2.071	2.420	2.669	0.009	0.008
2047	2.071	2.420	2.669	0.008	0.007
2048	2.071	2.420	2.669	0.008	0.007
2049	2.071	2.420	2.669	0.007	0.007
2050	2.071	2.420	2.669	0.007	0.006
2051	2.071	2.420	2.669	0.007	0.006
2052	2.071	2.420	2.669	0.007	0.006
2053	2.071	2.420	2.669	0.007	0.006
2054	2.071	2.420	2.669	0.007	0.006
2055	2.071	2.420	2.669	0.007	0.006
2056	2.071	2.420	2.669	0.007	0.006
2057	2.071	2.420	2.669	0.007	0.006
2058	2.071	2.420	2.669	0.007	0.006
2059	2.071	2.420	2.669	0.007	0.006
2060	2.071	2.420	2.669	0.007	0.006
2061	2.071	2.420	2.669	0.007	0.006
2062	2.071	2.420	2.669	0.007	0.006
2063	2.071	2.420	2.669	0.007	0.006
2064	2.071	2.420	2.669	0.007	0.006
2065	2.071	2.420	2.669	0.007	0.006
2066	2.071	2.420	2.669	0.007	0.006
2067	2.071	2.420	2.669	0.007	0.006
2068	2.071	2.420	2.669	0.007	0.006
2069	2.071	2.420	2.669	0.007	0.006
2070	2.071	2.420	2.669	0.007	0.006
2071	2.071	2.420	2.669	0.007	0.006
2072	2.071	2.420	2.669	0.007	0.006
2073	2.071	2.420	2.669	0.007	0.006
2074	2.071	2.420	2.669	0.007	0.006
2075	2.071	2.420	2.669	0.007	0.006
2076	2.071	2.420	2.669	0.007	0.006
2077	2.071	2.420	2.669	0.007	0.006
2078	2.071	2.420	2.669	0.007	0.006
2079	2.071	2.420	2.669	0.007	0.006
2080	2.071	2.420	2.669	0.007	0.006
2081	2.071	2.420	2.669	0.007	0.006
2082	2.071	2.420	2.669	0.007	0.006
2083	2.071	2.420	2.669	0.007	0.006
2084	2.071	2.420	2.669	0.007	0.006
2085	2.071	2.420	2.669	0.007	0.006
2086	2.071	2.420	2.669	0.007	0.006
2087	2.071	2.420	2.669	0.007	0.006
2088	2.071	2.420	2.669	0.007	0.006
2089	2.071	2.420	2.669	0.007	0.006
2090	2.071	2.420	2.669	0.007	0.006
2091	2.071	2.420	2.669	0.007	0.006
2092	2.071	2.420	2.669	0.007	0.006
2093	2.071	2.420	2.669	0.007	0.006
2094	2.071	2.420	2.669	0.007	0.006
2095	2.071	2.420	2.669	0.007	0.006
2096	2.071	2.420	2.669	0.007	0.006
2097	2.071	2.420	2.669	0.007	0.006
2098	2.071	2.420	2.669	0.007	0.006
2099	2.071	2.420	2.669	0.007	0.006
2100	2.071	2.420	2.669	0.007	0.006

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Department
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TAG Table A 3.3

Carbon Emissions

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Notes

Source: BEIS, 2021 Table 1 (electricity emission factors)
DfT Environmental Analysis - Liquid fuel to CO₂e emission factors

Notes:

- (1) Roads emissions factors are taken from the long-run marginal 'Domestic' series.
- (2) Rail emissions factors are based on long-run marginal 'Generation-based' series, plus a mark-up of 1.5% to account for transmission losses.
- (3) Liquid fuel emissions factors include non-carbon GHG and account for forecast biofuel blending rates.
- (4) Petrol, diesel and gas oil emissions factors are assumed to be flat post-2032 (aligning with levelling-off in Renewable Transport Fuel Obligation (RTFO) bioblend targets)
- (5) Electricity emissions factors are assumed by BEIS to be flat post-2050

This feeds Table A 3.3, Electricity and VoC Fuel
TAG 1: Unit 3.3.5 (Table 1)

Year	Petrol Kg CO ₂ e/l	Diesel Kg CO ₂ e/l	Gas Oil Kg CO ₂ e/l	Electricity Roads Kg CO ₂ e/kwh	Electricity Rail Kg CO ₂ e/kwh
2010	2.230	2.562	2.926	0.389	0.363
2011	2.256	2.611	2.926	0.384	0.356
2012	2.233	2.583	2.926	0.377	0.348
2013	2.226	2.705	2.758	0.367	0.341
2014	2.229	2.705	2.758	0.360	0.333
2015	2.229	2.704	2.757	0.350	0.324
2016	2.228	2.704	2.757	0.340	0.315
2017	2.226	2.705	2.758	0.330	0.306
2018	2.229	2.698	2.750	0.319	0.296
2019	2.229	2.657	2.709	0.308	0.285
2020	2.230	2.537	2.694	0.296	0.274
2021	2.227	2.523	2.694	0.283	0.262
2022	2.110	2.530	2.694	0.269	0.250
2023	2.110	2.523	2.694	0.255	0.236
2024	2.110	2.519	2.694	0.240	0.222
2025	2.110	2.515	2.694	0.224	0.208
2026	2.110	2.514	2.694	0.207	0.192
2027	2.110	2.513	2.694	0.189	0.175
2028	2.110	2.512	2.694	0.171	0.158
2029	2.110	2.511	2.694	0.151	0.140
2030	2.110	2.510	2.694	0.130	0.120
2031	2.110	2.509	2.694	0.105	0.097
2032	2.110	2.509	2.694	0.085	0.079
2033	2.110	2.509	2.694	0.069	0.064
2034	2.110	2.509	2.694	0.056	0.052
2035	2.110	2.509	2.694	0.045	0.042
2036	2.110	2.509	2.694	0.036	0.034
2037	2.110	2.509	2.694	0.029	0.027
2038	2.110	2.509	2.694	0.024	0.022
2039	2.110	2.509	2.694	0.019	0.018
2040	2.110	2.509	2.694	0.016	0.014
2041	2.110	2.509	2.694	0.013	0.012
2042	2.110	2.509	2.694	0.012	0.011
2043	2.110	2.509	2.694	0.012	0.011
2044	2.110	2.509	2.694	0.011	0.010
2045	2.110	2.509	2.694	0.010	0.009
2046	2.110	2.509	2.694	0.009	0.008
2047	2.110	2.509	2.694	0.008	0.007
2048	2.110	2.509	2.694	0.008	0.007
2049	2.110	2.509	2.694	0.007	0.007
2050	2.110	2.509	2.694	0.007	0.006
2051	2.110	2.509	2.694	0.007	0.006
2052	2.110	2.509	2.694	0.007	0.006
2053	2.110	2.509	2.694	0.007	0.006
2054	2.110	2.509	2.694	0.007	0.006
2055	2.110	2.509	2.694	0.007	0.006
2056	2.110	2.509	2.694	0.007	0.006
2057	2.110	2.509	2.694	0.007	0.006
2058	2.110	2.509	2.694	0.007	0.006
2059	2.110	2.509	2.694	0.007	0.006
2060	2.110	2.509	2.694	0.007	0.006
2061	2.110	2.509	2.694	0.007	0.006
2062	2.110	2.509	2.694	0.007	0.006
2063	2.110	2.509	2.694	0.007	0.006
2064	2.110	2.509	2.694	0.007	0.006
2065	2.110	2.509	2.694	0.007	0.006
2066	2.110	2.509	2.694	0.007	0.006
2067	2.110	2.509	2.694	0.007	0.006
2068	2.110	2.509	2.694	0.007	0.006
2069	2.110	2.509	2.694	0.007	0.006
2070	2.110	2.509	2.694	0.007	0.006
2071	2.110	2.509	2.694	0.007	0.006
2072	2.110	2.509	2.694	0.007	0.006
2073	2.110	2.509	2.694	0.007	0.006
2074	2.110	2.509	2.694	0.007	0.006
2075	2.110	2.509	2.694	0.007	0.006
2076	2.110	2.509	2.694	0.007	0.006
2077	2.110	2.509	2.694	0.007	0.006
2078	2.110	2.509	2.694	0.007	0.006
2079	2.110	2.509	2.694	0.007	0.006
2080	2.110	2.509	2.694	0.007	0.006
2081	2.110	2.509	2.694	0.007	0.006
2082	2.110	2.509	2.694	0.007	0.006
2083	2.110	2.509	2.694	0.007	0.006
2084	2.110	2.509	2.694	0.007	0.006
2085	2.110	2.509	2.694	0.007	0.006
2086	2.110	2.509	2.694	0.007	0.006
2087	2.110	2.509	2.694	0.007	0.006
2088	2.110	2.509	2.694	0.007	0.006
2089	2.110	2.509	2.694	0.007	0.006
2090	2.110	2.509	2.694	0.007	0.006
2091	2.110	2.509	2.694	0.007	0.006
2092	2.110	2.509	2.694	0.007	0.006
2093	2.110	2.509	2.694	0.007	0.006
2094	2.110	2.509	2.694	0.007	0.006
2095	2.110	2.509	2.694	0.007	0.006
2096	2.110	2.509	2.694	0.007	0.006
2097	2.110	2.509	2.694	0.007	0.006
2098	2.110	2.509	2.694	0.007	0.006
2099	2.110	2.509	2.694	0.007	0.006
2100	2.110	2.509	2.694	0.007	0.006

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TAG data book May 2025 [v2.01] Table A3.3 [Carbon Emissions]



Department
for Transport

TAG Table A 3.3

Carbon Emissions

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Notes	
Source:	DESNZ, 2023 Table 1 (electricity emission factors) DfT Low Carbon Fuels division - Liquid fuel to CO2e emission factors
Notes:	(1) Roads electricity emissions factors are taken from the long-run marginal 'Domestic' series. (2) Rail electricity emissions factors are taken from the long-run marginal 'Industrial' series. (3) All electricity emissions factors are assumed by DESNZ to be flat post-2050 (4) Liquid fuel emissions factors include carbon and non-carbon GHG and account for forecast biofuel blending rates from the Renewable Transport Fuel Obligation (RTFO) bioblend (5) Liquid fuel emissions factors are assumed to decrease to 2032 as the current RTFO bioblend targets increase. These targets then flat-line after 2032. (6) These figures include Scope 1 emissions (from combustion of the fuel). Biofuels blended in are assumed to have zero Scope 1 carbon emissions to account for the CO2 absorbed (7) The estimates here do not reflect the full fuel lifecycle meaning that Scope 2 and Scope 3 emissions are not included. For more guidance on out-of-scope emissions and what is v GHG reporting, conversion factors RTFO Compliance guidance, para 8.47
This feeds Table A 3.3, Electricity and VoC Fuel	
TAG 1: Unit 3.3.5 (Table 1)	

Table A 3.3: Carbon dioxide emissions per litre of fuel burnt / kWh used					
Year	Petrol Kg CO2e/l	Diesel Kg CO2e/l	Gas Oil Rail Diesel Kg CO2e/l	Electricity Roads Kg CO2e/kWh	Electricity Rail Kg CO2e/kWh
2010	2.230	2.562	2.926	0.389	0.375
2011	2.256	2.611	2.926	0.384	0.370
2012	2.233	2.583	2.926	0.377	0.364
2013	2.226	2.705	2.758	0.368	0.355
2014	2.229	2.705	2.758	0.362	0.348
2015	2.229	2.704	2.757	0.351	0.338
2016	2.228	2.704	2.757	0.340	0.328
2017	2.226	2.705	2.758	0.330	0.318
2018	2.229	2.698	2.750	0.319	0.307
2019	2.229	2.657	2.709	0.307	0.295
2020	2.230	2.537	2.694	0.293	0.283
2021	2.187	2.530	2.708	0.279	0.269
2022	2.136	2.503	2.703	0.264	0.254
2023	2.114	2.472	2.703	0.248	0.239
2024	2.114	2.462	2.703	0.230	0.222
2025	2.114	2.454	2.703	0.211	0.203
2026	2.114	2.443	2.703	0.191	0.184
2027	2.114	2.432	2.703	0.169	0.163
2028	2.114	2.421	2.703	0.145	0.140
2029	2.114	2.409	2.703	0.120	0.116
2030	2.114	2.398	2.703	0.093	0.090
2031	2.114	2.388	2.703	0.071	0.069
2032	2.114	2.376	2.703	0.055	0.053
2033	2.114	2.377	2.703	0.042	0.041
2034	2.114	2.378	2.703	0.032	0.031
2035	2.114	2.383	2.703	0.025	0.024
2036	2.114	2.382	2.703	0.019	0.018
2037	2.114	2.382	2.703	0.015	0.014
2038	2.114	2.381	2.703	0.011	0.011
2039	2.114	2.382	2.703	0.009	0.008
2040	2.114	2.382	2.703	0.007	0.006
2041	2.114	2.382	2.703	0.006	0.006
2042	2.114	2.383	2.703	0.004	0.004
2043	2.114	2.383	2.703	0.003	0.003
2044	2.114	2.385	2.703	0.002	0.002
2045	2.114	2.386	2.703	0.001	0.001
2046	2.114	2.387	2.703	0.001	0.001
2047	2.114	2.388	2.703	0.001	0.001
2048	2.114	2.389	2.703	0.002	0.001
2049	2.114	2.390	2.703	0.002	0.001
2050	2.114	2.392	2.703	0.001	0.001
2051	2.113	2.374	2.700	0.003	0.002
2052	2.113	2.374	2.700	0.003	0.002
2053	2.113	2.374	2.700	0.003	0.002
2054	2.113	2.374	2.700	0.003	0.002
2055	2.113	2.374	2.700	0.003	0.002
2056	2.113	2.374	2.700	0.003	0.002
2057	2.113	2.374	2.700	0.003	0.002
2058	2.113	2.374	2.700	0.003	0.002
2059	2.113	2.374	2.700	0.003	0.002
2060	2.113	2.374	2.700	0.003	0.002
2061	2.113	2.374	2.700	0.003	0.002
2062	2.113	2.374	2.700	0.003	0.002
2063	2.113	2.374	2.700	0.003	0.002
2064	2.113	2.374	2.700	0.003	0.002
2065	2.113	2.374	2.700	0.003	0.002
2066	2.113	2.374	2.700	0.003	0.002
2067	2.113	2.374	2.700	0.003	0.002
2068	2.113	2.374	2.700	0.003	0.002
2069	2.113	2.374	2.700	0.003	0.002
2070	2.113	2.374	2.700	0.003	0.002
2071	2.113	2.374	2.700	0.003	0.002
2072	2.113	2.374	2.700	0.003	0.002
2073	2.113	2.374	2.700	0.003	0.002
2074	2.113	2.374	2.700	0.003	0.002
2075	2.113	2.374	2.700	0.003	0.002
2076	2.113	2.374	2.700	0.003	0.002
2077	2.113	2.374	2.700	0.003	0.002
2078	2.113	2.374	2.700	0.003	0.002
2079	2.113	2.374	2.700	0.003	0.002
2080	2.113	2.374	2.700	0.003	0.002
2081	2.113	2.374	2.700	0.003	0.002
2082	2.113	2.374	2.700	0.003	0.002
2083	2.113	2.374	2.700	0.003	0.002
2084	2.113	2.374	2.700	0.003	0.002
2085	2.113	2.374	2.700	0.003	0.002
2086	2.113	2.374	2.700	0.003	0.002
2087	2.113	2.374	2.700	0.003	0.002
2088	2.113	2.374	2.700	0.003	0.002
2089	2.113	2.374	2.700	0.003	0.002
2090	2.113	2.374	2.700	0.003	0.002
2091	2.113	2.374	2.700	0.003	0.002
2092	2.113	2.374	2.700	0.003	0.002
2093	2.113	2.374	2.700	0.003	0.002
2094	2.113	2.374	2.700	0.003	0.002
2095	2.113	2.374	2.700	0.003	0.002
2096	2.113	2.374	2.700	0.003	0.002
2097	2.113	2.374	2.700	0.003	0.002
2098	2.113	2.374	2.700	0.003	0.002
2099	2.113	2.374	2.700	0.003	0.002
2100	2.113	2.374	2.700	0.003	0.002

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Appendix B – Transport Appraisal Guidance (TAG) Proportionate Update Process

B.1 January 2014 Department for Transport, Transport Analysis Guidance (TAG) - The Proportionate Update Process, available from: <https://www.gov.uk/transport-analysis-guidance-tag>



Department
for Transport

TRANSPORT ANALYSIS GUIDANCE

The Proportionate Update Process

January 2014

Department for Transport

Transport Analysis Guidance (TAG)

<https://www.gov.uk/transport-analysis-guidance-tag>

This TAG Unit is guidance for the **TECHNICAL PROJECT MANAGER**

Technical queries and comments on this TAG Unit should be referred to:

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1 Principles of the TAG Proportionate Update Process

1.1 Introduction

- 1.1.1 This Unit sets out the principles for the proportionate updating of Business Cases in response to changes to TAG guidance.

1.2 Governance of the guidance – The orderly release process

- 1.2.1 The Department updates TAG to keep its methods and values in line with good practice, meeting the Treasury's Green Book guidance on appraisal and evaluation in Central Government.
- 1.2.2 Some projects using TAG to generate advice to decision-makers have lifecycles of many years from inception to delivery, with multiple decision points requiring modelling and appraisal advice along the way. For these projects, the resulting changes to modelling and appraisal methods and/or values beyond that already planned for can increase the resources, cost, and/or time needed to prepare business cases.
- 1.2.3 The TAG Orderly Release Process provides advance notice of changes to TAG. This gives more certainty of the timetable for changes and early sight of forthcoming revisions, allowing scheme promoters and sponsors to plan the work required to implement the changes.

1.3 The principles of proportionate updating

- 1.3.1 While sound planning of business case development, assisted by the Orderly Release Process, can minimise the cost, resource, and time needed to ensure a business case remains in step with latest evidence, it is nonetheless reasonable for project sponsors to decide what updates to business cases it is proportionate to make when TAG, or other guidance / evidence changes.
- 1.3.2 The Department expects that such decisions should be made on a scheme by scheme basis, and be based on balancing the need to ensure decisions are based on up-to-date evidence with the need to support decision makers in delivering their programme. This should involve reasonably balancing (a) the greater time, cost, and/or resource needed to deliver programmes, with (b) the quality of the analysis submitted to assist the decision required, including its robustness against potential challenge from all sources.

Who should decide?

- 1.3.3 The decision on this balance should be taken by the scheme sponsor¹, making proper use of the governance framework overseeing the work and resulting decision advice (e.g. an Investment Board), seeking advice and agreement from relevant centres of excellence (e.g. the appropriate analytical team in the overseeing organisation) and legal advisors.

How should this be decided?

- 1.3.4 It is difficult to set down overarching guidance on what this balance should be for different types of project, decision points, or TAG changes and the relevant considerations and factors for each project may be different. However, it is reasonable to presume that the case for not adopting latest evidence would be stronger the more it can be shown that:
- the changes are not material to the decision at hand;

¹ The scheme sponsor is defined here as the party responsible for funding the proposed transport scheme from a central resource. In more simple terms, the sponsor is the party that receives a transport investment business case, where the promoter is responsible for preparing the business case and the supporting analysis.

- adopting the change would require significant increase in the resources, cost, and/or time needed to prepare the decision advice; and
- the risk of successful legal challenge is low; and,
- the risk of damage to the reputation of the analysis supporting the scheme, or the Department's wider portfolio, is low.

- 1.3.5 This approach has been developed primarily for sponsors inside DfT. To the extent that sponsors outside of the Department take decisions such as these, and apply the above reasoning, they should satisfy themselves that the decision taken on balancing these elements is appropriate. Moreover, decisions by sponsors outside the Department whether or not to adopt guidance changes is taken entirely at their own risk and the Department cannot be held responsible for any loss of damage flowing from that decision.
- 1.3.6 When considering this balance, scheme sponsors should be aware there could also be the option of adopting the changes to TAG in an additional sensitivity test. This could sometimes be delivered at lower time/resource cost, while helping to mitigate some of the risks from not fully updating the central case analysis.

When to update

- 1.3.7 Updates to analytical models and appraisals, where they are deemed to be material, should be programmed to coincide with forthcoming decision-points within a project. The Department would not expect work to be undertaken to update analysis as a general necessity where it will not be used. Promoters should therefore plan when changes should be implemented for their work programme, considering the balance of factors described above.
- 1.3.8 It is also worth noting explicitly that the Department would not expect promoters to retrospectively revisit transport analyses used to inform final funding decisions in light of guidance changes.

1.4 Analytical Assurance

- 1.4.1 The degree to which analysis underpinning advice to decision-makers is based on the latest TAG guidance (and other evidence), and the steps taken by the project team to mitigate any resulting risks, is an important part of the analytical assurance surrounding the advice. This information should form part of the decision advice to schemes sponsors.

2 References

HM Treasury (2013), The Green Book: appraisal and evaluation in central government, <https://www.gov.uk/government/publications/the-green-book-appraisal-and-evaluation-in-central-government>

3 Document Provenance

This TAG Unit is based on previous TAG Unit 1.5 – [The Proportionate Update Process](#).



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