

Western Gateway Sub National Transport
Body (WGSTB)

CARBON MANAGMENT





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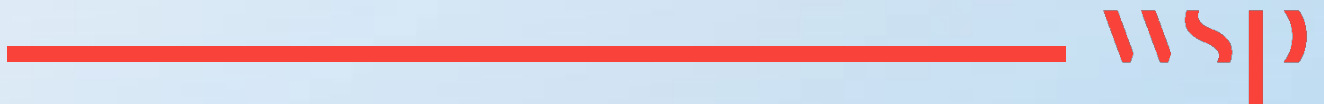


INTRODUCTION

This report details the outcome of Tasks 1 -3 in relation to carbon (as outlined in the Transport Carbon Audit tender prepared by WGSTB). Note, the pricing element of task 3 will be presented within a separate document.

1

**ASSESSMENT OF RELEVANT
METHODOLOGIES FOR
ESTABLISHING A TRANSPORT
CARBON BASELINE**



1 ASSESSMENT OF RELEVANT METHODOLOGIES FOR ESTABLISHING A TRANSPORT CARBON BASELINE

SUMMARY

This section benchmarks a variety of transport carbon modelling tools to provide WGSTB with an understanding of the available tools and their advantages and disadvantages.

To undertake an assessment of the available and relevant methodologies for establishing a transport carbon baseline, a pro forma was created which posed consistent questions to each 'carbon tool' assessed for this exercise, including the proposed WSP Bespoke tool.

Information collected included the following:

- What input data does it require
- What approach does it follow e.g. top-down or bottom-up
- What outputs are produced
- Any additional functionality

Table 1-1 summarises the results of the pro forma in no particular order of significance.

Table 1-1 - Assessment of transport carbon modelling tools

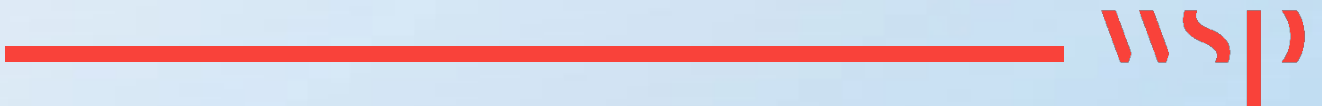
Tool	Inputs	Approach	Outputs
SCATTER (Ref 1)	Data is taken directly from the regional and local authority dataset published by BEIS relating to energy consumption	Top-down	Transport emissions for local authority area, including some scope 3 emissions
BEIS (Ref 2)	Uses the latest year of BEIS local and regional emissions data	Top-down / Bottom-up (hybrid)	Annual emissions for industry and commercial, domestic, and transport (road and diesel railway) at local authority level
WSP Bespoke Tool	Raw traffic data for the entire road network, operational tram and rail data and WebTAG emissions data (including fuel consumption rates, fuel type and associated emission factors).	Bottom-up	Provides a detailed emissions estimate for the entire transport network within the area and provides a detailed breakdown of various emission splits, including emissions by road type and trip genesis.

Tool	Inputs	Approach	Outputs
The Environmental Insights Explorer (EIE) from Google (Ref 3)	Actual measurements of activity and infrastructure based on Google Maps data	Bottom-up	Emissions from road transport within city boundaries.
Emissions Factor Toolkit from DEFRA (Ref 4)	A range of parameters taken from the National Atmospheric Emissions Inventory, including fleet composition data	Top-down / Bottom-up (hybrid)	Provides emission rates from 2018 through to 2030 for a specified year.
UK Energy Research transport model (Ref 5)	A range of monetary and social variables (e.g. GDP, demographics, income, pre-tax fuel prices)	Bottom-up	Travel demand, vehicle ownership and use, energy demand, life cycle emissions of 26 pollutants.

For a more detailed analysis of the background, approach and accuracy of each tool please refer to Appendix A.

2

OVERVIEW OF CARBON BASELINING WORK BY AUTHORITIES



2 OVERVIEW OF CARBON BASELINING WORK BY AUTHORITIES

SUMMARY

This section details the carbon baselining work that has been undertaken by WGSTB authorities and by relevant organisations as requested by WGSTB (Highways England and Network Rail).

WGSTB AUTHORITIES

Table 2-1 below provides an indication of each WGSTB authority's carbon strategy status and baselining activity.

Table 2-1 - Review of carbon baselining work undertaken by WGSTB authorities

Local Authority	Carbon/Climate strategy status	Completed baselining?	Completed future baselining?
Bath / North East Somerset (Ref 7)	Carbon targets/Climate Strategy in place	✓	✓
Bournemouth, Christchurch and Poole Council (Ref 8)	Carbon targets/Climate Strategy in place	✓	x
Bristol City Council (Ref 9)	Carbon targets/Climate Strategy in place	✓	✓
Dorset Council (Ref 10)	Carbon targets/Climate Strategy in place	✓	✓
Gloucestershire County Council (Ref 11)	Carbon targets/Climate Strategy in place	✓	x
North Somerset Council (Ref 12)	Carbon targets/Climate Strategy in place	✓	x
South Gloucestershire Council (Ref 13)	Carbon targets/Climate Strategy in place	✓	x

Local Authority	Carbon/Climate strategy status	Completed baselining?	Completed future baselining?
Wiltshire Council (Ref 14)	Carbon targets/Climate Strategy in place	✓	✓
WECA (Ref 15)	Carbon targets/Climate Strategy in place	✓	✓

All WGSTB authorities have completed a carbon baselining activity for transport to varying degrees of detail/granularity, with some authorities also having completed some future baselining. Where carbon baselining has been undertaken a top-down approach has been applied (namely using BEIS data or SCATTER).

Further details of the carbon targets, the baselining that each organisation/authority have undertaken and the approach to baselining is provided in Appendix B.

ORGANISATIONS

Table 2-2 below provides an indication of the carbon strategy development/carbon baselining work undertaken by Highways England and Network Rail.

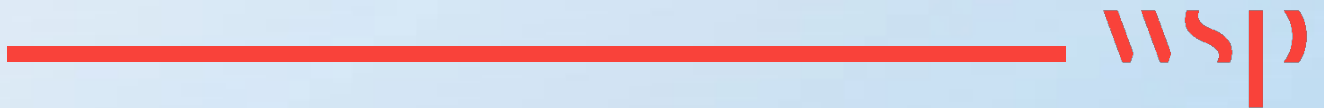
Table 2-2 - Review of carbon baselining work undertaken by Highways England and Network Rail

Commitments	Climate Strategy / Baselining
Highways England	
<ul style="list-style-type: none"> To support government's ambition to achieve net zero UK carbon emissions by 2050. Further ambitions are currently under development. 	WSP has been commissioned to undertake transport carbon emissions baselining for Highways England. This will involve the development of a bespoke transport calculator tool, similar to the requirement of task 3 within WGSTB brief, however the scope is slightly different. Only the strategic road network (SRN) will be assessed as part of this work.
Network Rail (Ref 6)	

Commitments	Climate Strategy / Baselineing
<ul style="list-style-type: none"> • Net zero carbon emissions by 2050 (and 2045 in Scotland) • Scope 1&2 science-based target with interim milestones e.g. 2024: 24%, 2029: 46%, carbon reduction in infrastructure compared to Control Period 6 (CP6) • 2034: 75% carbon reduction in infrastructure compared to Control Period 6 	<p>Network Rail has set out a Decarbonisation Programme Workstream and a Traction Decarbonisation Network Strategy, which outlines a national framework for how Network Rail as business can contribute towards the Government's target of net zero carbon emissions by 2050.</p> <p>Network Rail are currently drafting a remit to enable them to take the findings of the national framework and produce a Regional Decarbonisation for the Wales & Western part of Network Rail. The regional strategy will look into how do they decarbonise their network, ourselves and supply chains. The plan is to produce the strategy in 2021/22.</p>

3

RECOMMENDATIONS



3 RECOMMENDATIONS

Based on the outcome of Tasks 1 and 2 and feedback from representatives for each local authority at the carbon workshop held on 29th May 2021, it is recommended that a bespoke transport carbon tool is developed for WGSTB to accurately estimate carbon emissions from transport within the area. Furthermore, a bespoke tool will provide the most comprehensive and granular breakdown of emissions for various components (note option 3.2 will provide the most thorough breakdown of emissions). This will enable the local authorities within WGSTB to introduce specific measures to reduce emissions in various hotspots identified and reach net zero targets.

To estimate emissions from transport within WGSTB transport outputs will be converted to emissions data in-line with best practice (ISO14064¹ and PAS2080²) within the bespoke excel based calculation tool and presented as tCO₂e. Specifically, the approach will align with WebTAG³, and LA114⁴. In practice this means using the TAG Data Book and DFT statistics⁵ to convert the outputs of the modelling assessment to GHG emissions. By taking into consideration vehicle fleet, fuel type and consumption rates, this method will result in best estimate of baseline emissions within the transport area.

¹ International Organization for Standardization ISO 14064-1:2018 Greenhouse gases Available at <https://www.iso.org/standard/66453.html>

² Carbon Management in Infrastructure, British Standards Institution, May 2016.

³ Department for Transport (2015) TAG Unit A3 Environmental Impact Appraisal Available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/638648/TAG_unit_a3_envir_imp_app_dec_15.pdf

⁴ Design Manual for Roads and Bridges (2019) Sustainability & Environment Appraisal LA 114 Climate Available at: <https://www.standardsforhighways.co.uk/prod/attachments/87f12e4f-70f8-4eed-8aed-9e9a42e24183?inline=true>

⁵ DFT (2019) WebTAG data book <https://www.gov.uk/government/publications/tag-data-book> and DFT (2018) Road Statistics <https://www.gov.uk/government/collections/road-traffic-statistics>

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APPENDIX TITLE



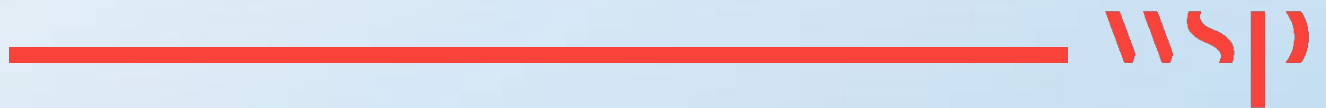
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Appendix A

REVIEW OF TRANSPORT CARBON MODELLING TOOLS



APPENDIX A

A list of the calculators considered as part of this task along with an overview of the results from the assessment undertaken by WSP can be found in the Table 1-1.

Table A-1 below provides more context for the background, approach and accuracy of the tools assessed for establishing a transport carbon baseline.

Table A-1 - Review of transport carbon modelling tools

Tool	Background	Approach	Accuracy
SCATTER (Ref 1)	SCATTER has two main functions: calculating greenhouse gas inventories with carbon reporting outputs, and modelling carbon reduction pathways.	A top-down approach is undertaken. Data is taken directly from the regional and local authority dataset published by BEIS relating to energy consumption.	The SCATTER tool is useful for an estimate of regional emissions. However, traffic data is not available on a link by link basis for the majority of minor roads using BEIS published data. Therefore, the outcome may be an underestimate of emissions.
BEIS (Ref 2)	<p>The dataset provides a spatial disaggregation of territorial CO₂ emissions from the UK Greenhouse Gas Inventory (GHGI), part of the National Atmospheric Emissions Inventory (NAEI), on an end user basis.</p> <p>This means that emissions from the production and processing of fuels, including the production of electricity, are reallocated to users of these fuels to reflect total emissions for each type of fuel consumed.</p>	Top-down approach to estimating emissions by using the latest year of BEIS regional emissions data and apply high-level assumptions to determine annual reductions in emissions.	Useful for a high-level estimate of emissions. However, this approach is highly assumptive and won't provide an accurate estimate of regional emissions.

Tool	Background	Approach	Accuracy
<p>WSP Bespoke Tool</p>	<p>An excel based tool developed by WSP to provide an estimate of emissions by various splits in transport e.g. emissions by time of day, road type or trip genesis using raw traffic data specific to the region in focus.</p>	<p>The bespoke tool applies a bottom-up approach to estimating emissions based on raw traffic data for the entire road network and operational tram and rail data. The WebTAG methodology is then applied to estimate carbon emissions using UK specific emission factors that forecast into the future to take into account changes in fuel consumption.</p>	<p>As region specific data from the entire road, rail and tram network (as far as possible) are considered, this tool provides the most accurate estimate of emissions within a region. Furthermore, the tool provides granular detail of emissions in specific regions which can be used to inform specific policy measures to reduce carbon.</p>
<p>The Environmental Insights Explorer (EIE) from Google (Ref 3)</p>	<p>The Google Environmental Insights Explorer tool, created in partnership with the Global Covenant of Mayors for Climate & Energy, has been designed to give cities and local governments access to their current emission levels, so they can build a plan to reduce and measure emission levels.</p>	<p>The insights are a modeled estimate based on actual measurements of activity and infrastructure (the same underlying information that is made available in Google Maps). This is used to understand how people are moving around the world, and then scaling factors, efficiency and generic emissions factors are applied.</p>	<p>Google doesn't state what emission factors are used therefore it cannot be determined whether the factors are relevant to the UK/specific areas.</p>
<p>Emissions Factor Toolkit from DEFRA (Ref 4)</p>	<p>The road traffic Emissions Factors Toolkit (EFT) user guide has been compiled by Bureau Veritas in the role of Project Manager for the Local Air Quality Management (LAQM).</p>	<p>The toolkit provides emission rates from 2018 through to 2030 and takes into consideration information available from the National Atmospheric Emissions Inventory (NAEI) including, fleet composition and technology conversions in the national fleet.</p>	<p>The tool only considers road traffic emissions and does not assess emissions from rail or trams. Furthermore, it does not consider emissions from the entire road network.</p>



Tool	Background	Approach	Accuracy
UK Energy Research transport model (Ref 5)	The tool is built around a modular database structure, it estimates future transport supply and demand, for all passenger and freight modes of transport, and calculates the corresponding energy use, life cycle emissions and environmental impacts year-by-year from a baseline year.	The tool uses a number of parameters to determine transport demand. This includes GDP and population growth.	Although the tool can provide a detailed breakdown of emissions, the breakdown of emissions from using this tool would not be as granular as the breakdown can be by using raw traffic data to build up an estimate of emissions.

Appendix B

WGSTB AUTHORITIES CARBON TARGETS AND BASELINING WORK



APPENDIX B

With reference to Table 2-1, further commentary on the carbon targets and the baselining that each WGSTB authority have undertaken is presented in Table B-1.

Table B-1 - WGSTB authorities carbon targets and baselining work

Commitments	Baselining/ Future Baselining Comments
Bath / North East Somerset (Ref 16)	
Target to be carbon neutral by 2030.	Anthesis undertook an initial carbon footprint and 2030 net zero trajectory in 2019 for Bath/North East Somerset, which included a 'business as usual' trajectory. The initial footprint and 2030 trajectory was calculated using SCATTER and is currently being updated.
Bournemouth, Christchurch and Poole Council (Ref 8)	
Target to be carbon neutral by 2030.	Combination of two methodologies over two different years top-down BEIS approach for Scope 1 and 2 (2018 data) SCATTER for Scope 3 (2017 data)
Bristol City Council (Ref 17 and Ref 21)	
Target to become carbon neutral by 2030.	Regen has undertaken carbon baselining for Bristol City Council. The methodology involved utilising BEIS LA data with a calculation model developed by Regen, which takes the vehicles registered as a good indication of the mix of vehicle types in the city, but then reduces the average mileage per vehicle to match the vehicle mileage estimate from the road traffic survey. This allowed for an assessment of how future changes in vehicle type/fuel usage would affect emissions, which contributed to the future trajectory analysis.
Dorset Council (Ref 10)	
Dorset Council has a target to be carbon neutral Council by 2040.	Dorset Council has used BEIS data to provide a high-level estimate of various emissions pathways out to 2050. It should be noted that each of the emission pathways starts with estimated data. Once the full data been determined more accurately, Dorset Council plans to publish annual budget figures for each pathway.
Gloucestershire County Council (Ref 11)	
Target to become a carbon neutral county by 2045.	Gloucestershire County Council has undertaken carbon baseline analysis of emissions by sector in 2017 using BEIS subset data. Gloucestershire County Council plans to undertake a transport carbon baseline audit in 2021 by developing a spreadsheet model to produce

Commitments	Baselining/ Future Baselining Comments
	road and rail emissions estimates on the basis of emissions factors for each vehicle and fuel type, taking account of speed and real-world uplifts using data from the SATURN model, DVLA, NAEI and rail route network. This audit will include future year reference scenario total emissions.
North Somerset Council (Ref 18)	
Target to be carbon neutral by 2030.	Estimated emissions using BEIS activity data, including sub-national energy data and BEIS emission conversion factors to provide a high-level estimate of baseline emissions.
South Gloucestershire Council (Ref 19)	
<p>The council has pledged to provide the leadership to enable South Gloucestershire to become carbon neutral by 2030</p> <p>In addition, the council is signed up to the UK100 pledge that commits to net zero council emissions by 2030 and net zero area-wide emissions by 2045.</p>	<p>Regen has undertaken carbon baseline analysis for road transport for South Gloucestershire Council using a baseline year of 2017. The emissions totals are based upon the number of each vehicle type registered in the area, and the average mileage for those vehicles in the area. This provides a slightly more accurate estimate of emissions than the BEIS data which applies national data to the emissions estimate. Note, the South Gloucestershire Council estimate excludes emissions from motorways. The carbon emissions baseline report does not refer to emissions modelling for additional forms of transport such as trams or rail.</p>
Wiltshire Council (Ref 14)	
Commitment to become a carbon neutral council by 2030.	Wiltshire Council have used BEIS 2018 local authority emissions data to estimate baseline emissions and have applied a business as usual scenario (BAU) to make a high-level projection out to 2030. The climate report doesn't detail how the 2030 estimate was determined.
WECA (Ref 20)	
The West of England has set an ambitious goal for tackling climate change, committing to net zero carbon by 2030.	<p>WECA has undertaken a top-down approach to estimating emissions, this is included within the Climate Emergency Action Plan (CEAP) for WECA. The approach used BEIS and DfT data to provide a high-level estimate of baseline emissions.</p> <p>WECA is also undertaking a Transport Decarbonisation study. It is envisaged that the study will generate a set of options, each with a proportionate contribution towards the overall 2030 commitment.</p>

