AtkinsRéalis

The Movement Strategy for Bath

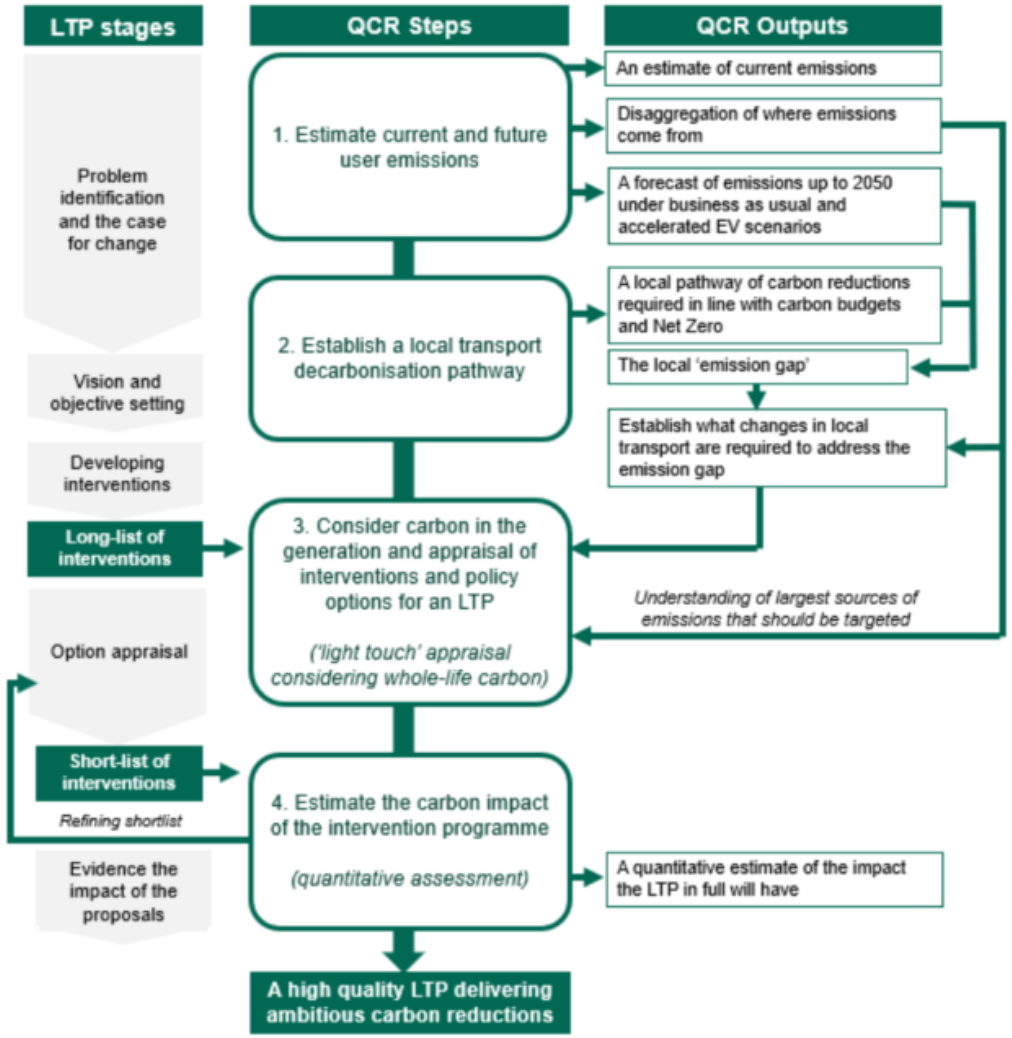
October 2025

Technical Appendix B: Carbon Assessment Playbook

Contents

Context to the Carbon Assessment Playbook

- Strong policy context set in DfT's 2021 Transport decarbonisation plan.
- Highlighted the importance of locally-led, place-focused approaches to decarbonising the transport system.
- Early draft versions of the LTP Guidance included draft 'QCR Guidance'.
- LTP Guidance stalled but the Sub-National Transport Bodies have been developing a suite of products to help local authorities, including the Carbon Assessment Playbook.
- This includes baseline data, tools for forecasting impacts, and specific reports for each local authority, including B&NES.



Why is this important?

- **Single source of the truth:** applicable to all local authorities across England, and useful in benchmarking against peer authorities.
- **Support stakeholder engagement:** robust, evidence-based, and peer-reviewed.
- **Rapid understanding of sources of emissions:** by vehicle type, trip type, different parts of the authority.
- **Understand impacts of different policies:** through use of a policy builder to inform development of Local Transport Plans and strategies.
- **Not just for carbon assessment:** the tools also help in understanding broader travel patterns and scope for mode shift from different policies.

- **But there are some caveats….**
- It doesn't provide guidance on how to achieve the very steep reductions needed (e.g. 25% reduction in vehicle-km per person).
- Based on generic policy measures and limited ex-post evaluation in many cases.
- It's therefore a tool but it is only a starting point.

B&NES is already well on the way

- Strong evidence base and policy context
- Climate Emergency Outline Plan, October 2019
- Journey to Net Zero: Phase 1 Current and Future Challenges (April 2020) and Journey to Net Zero Final Report (May 2022).
- Clear ambitions have been set:

Table 1.4: Climate Emergency Outline Plan Transport Targets

Area	Headline Measures
On-road transport	• 25% reduction in vehicle km per person • Modal shift creates 7% reduction in car travel • Electric cars: 76% pure battery EV, 14% Petrol Hybrid EV • 76% electric buses, 24% hybrid buses
Freight	• 37% of rail freight is electric • Road freight remains diesel
Passenger Rails	• 100% passenger rail electrification

25% reduction in veh-km per person needed to offset the impacts of rising population and travel demand.

This helps tackle the effects of a ~20% increase in travel demand.

Leading to 7% reduction in car travel. This is broadly consistent with recommendations in the CCC's 6th Carbon Budget.

Benchmarking B&NES

	B&NES	Bristol	South Glos	Wiltshire
Transport emissions ($MtCO_2e$)	**0.266**	0.58	0.922	1.273
Internal	**30%**	36%	13%	30%
To/from	**43%**	38%	26%	39%
Through	**20%**	22%	61%	27%
Emissions per capita (tCO_2e/pn)	**1.4**	1.2	3.2	2.5
Excluding through traffic	**1.0**	0.9	1.1	1.7
Car	**70%**	70%	59%	63%
LGV	**17%**	16%	17%	16%
HGV	**10%**	11%	21%	18%
PSV	**3%**	3%	3%	3%
<1 mile	**2%**	1%	1%	0%
Up to 5 miles	**18%**	24%	15%	12%
Up to 10 miles	**41%**	43%	41%	29%
Up to 25 miles	**79%**	58%	69%	64%
Up to 50 miles	**88%**	73%	84%	83%
Incl trips over 50 miles	**100%**	100%	100%	100%

20% of emissions in B&NES are from through traffic (vs **61%** in South Glos). Through traffic significantly skews average emissions per capita.

Excluding through traffic, B&NES sits between Bristol and South Glos.

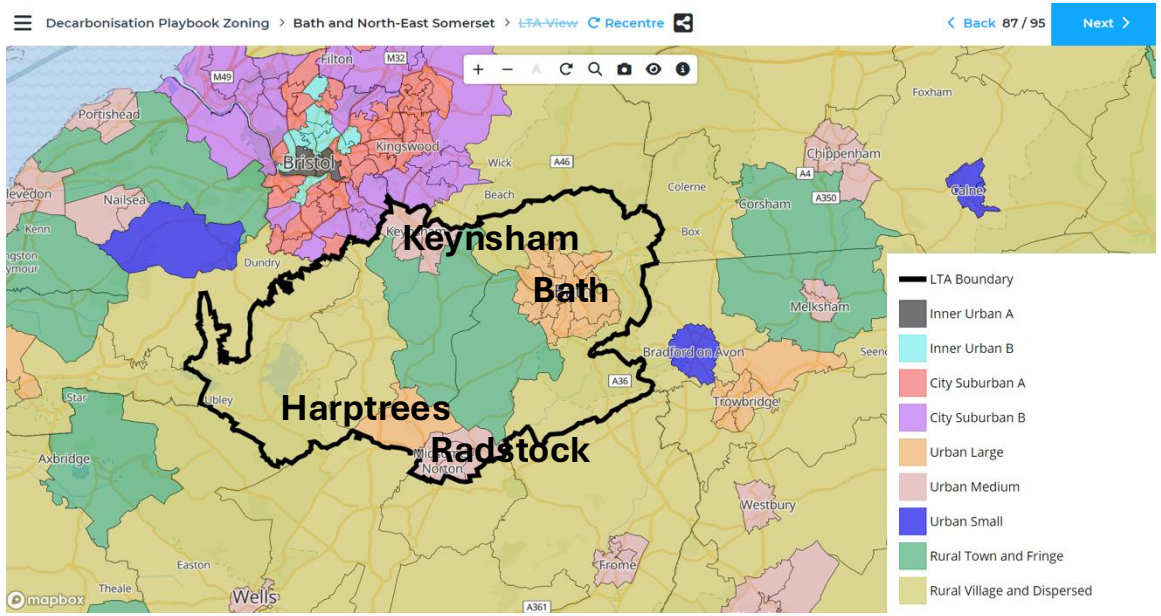
HGVs form a smaller proportion of emissions in B&NES than South Glos and Wiltshire.

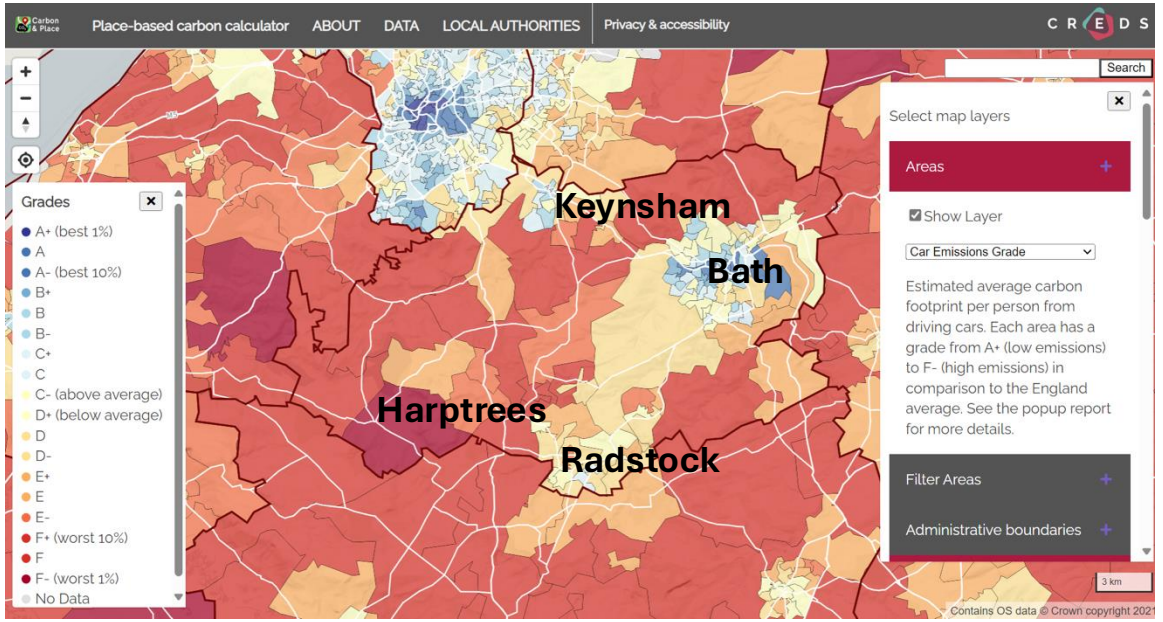
PSVs are consistently ~3% of total emissions across local authorities.

More carbon is generated from shorter journeys (up to 25 miles) in B&NES.

Bristol, S Glos and Wiltshire carry longer-distance motorway traffic.

Place types





76% of total emissions are generated from our urban areas (Bath, Keynsham, Norton-Radstock).
24% of emissions are generated by our rural areas.

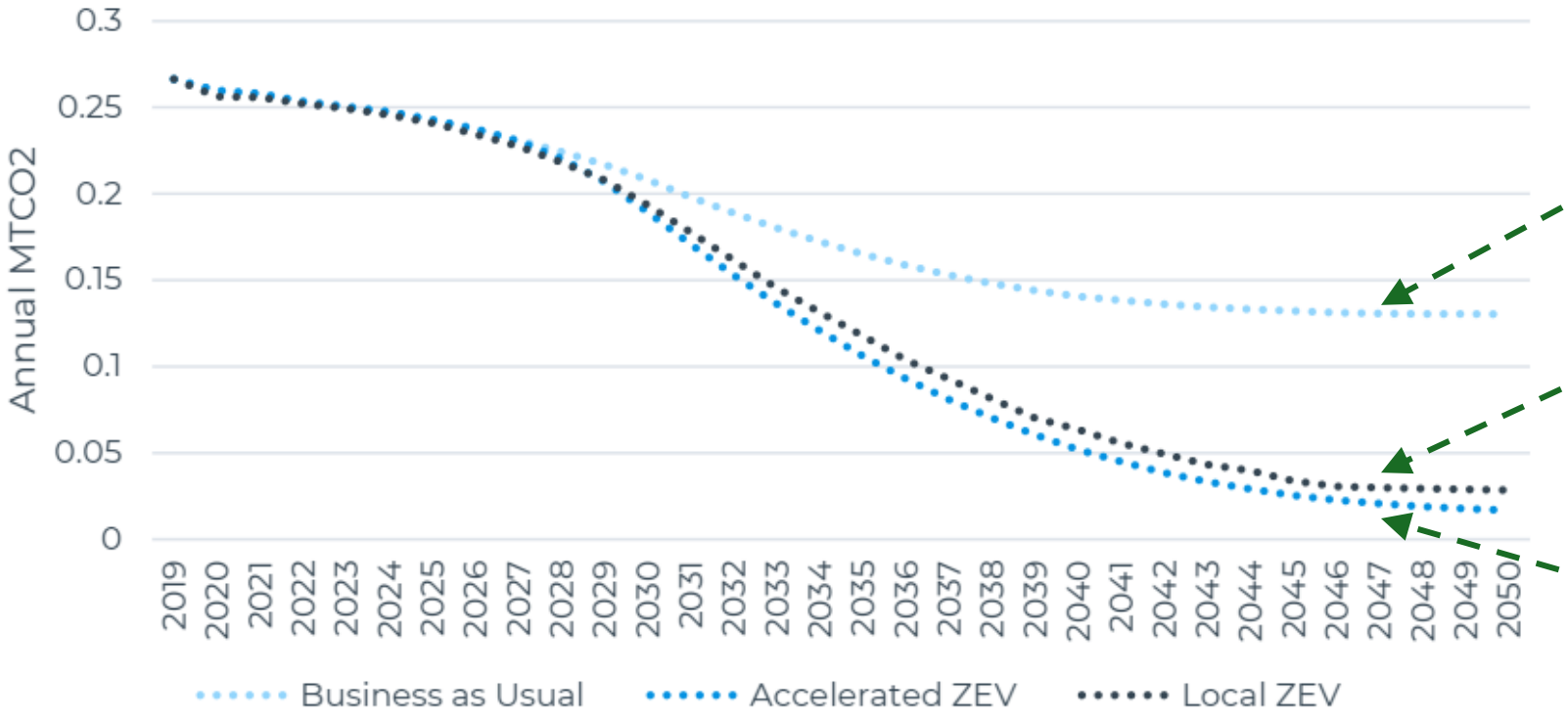
Urban Large: 59% (Bath)
Urban Medium: 17% [Keynsham, Norton Radstock]
Rural Town/Fringe: 8% [e.g. Saltford]
Rural Village: 16% [e.g. Chew Valley]

But emissions **per capita** are much lower in the urban areas (in blue in the map above). Emissions per capita are higher in the rural areas (shown in red), due to longer distances travelled, lack of alternatives to the car, and much higher car ownership.

We must also consider the interactions between our urban and rural areas.

Source of first map : Bath and North-East Somerset - Decarbonisation Playbook Zoning - Cadence 360
Source of second map : Place-based carbon calculator

Forecast emissions



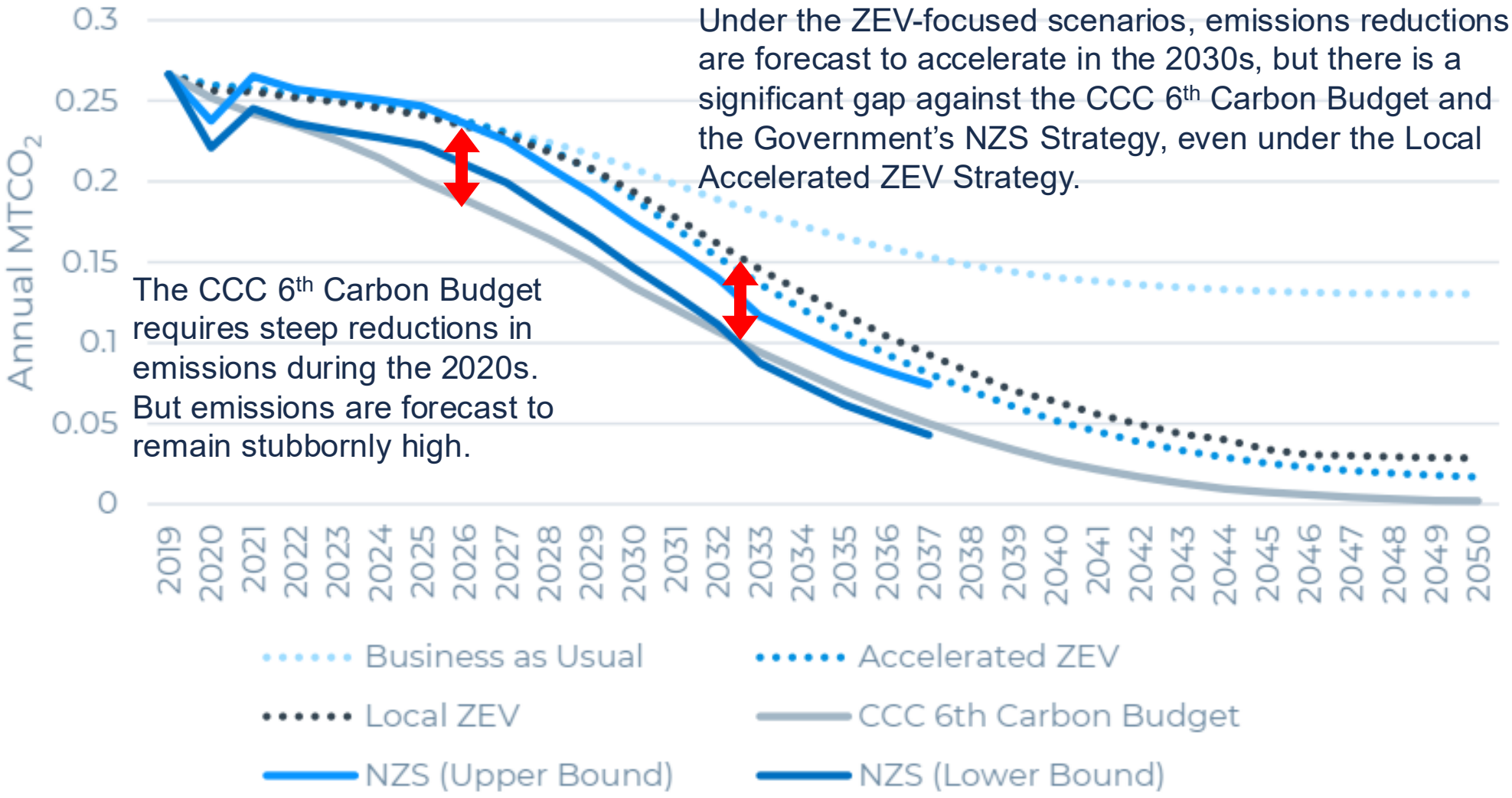
Business as Usual: reflects no action to encourage more uptake of ZEVs. This will not hit Net Zero.

Local ZEV: reflects ambitious local action to encourage transition to ZEVs.

Accelerated ZEV: reflects bold national action to encourage people to transition to ZEVs.

This chart shows forecast changes in carbon emissions from the 2019 base year to 2050, under different scenarios for uptake of Zero Emissions Vehicles (ZEVs). Accelerating the uptake of ZEVs will be critical in reducing transport emissions. However, the chart on the next page shows this will not be sufficient to meet national and local ambitions for transport decarbonisation.

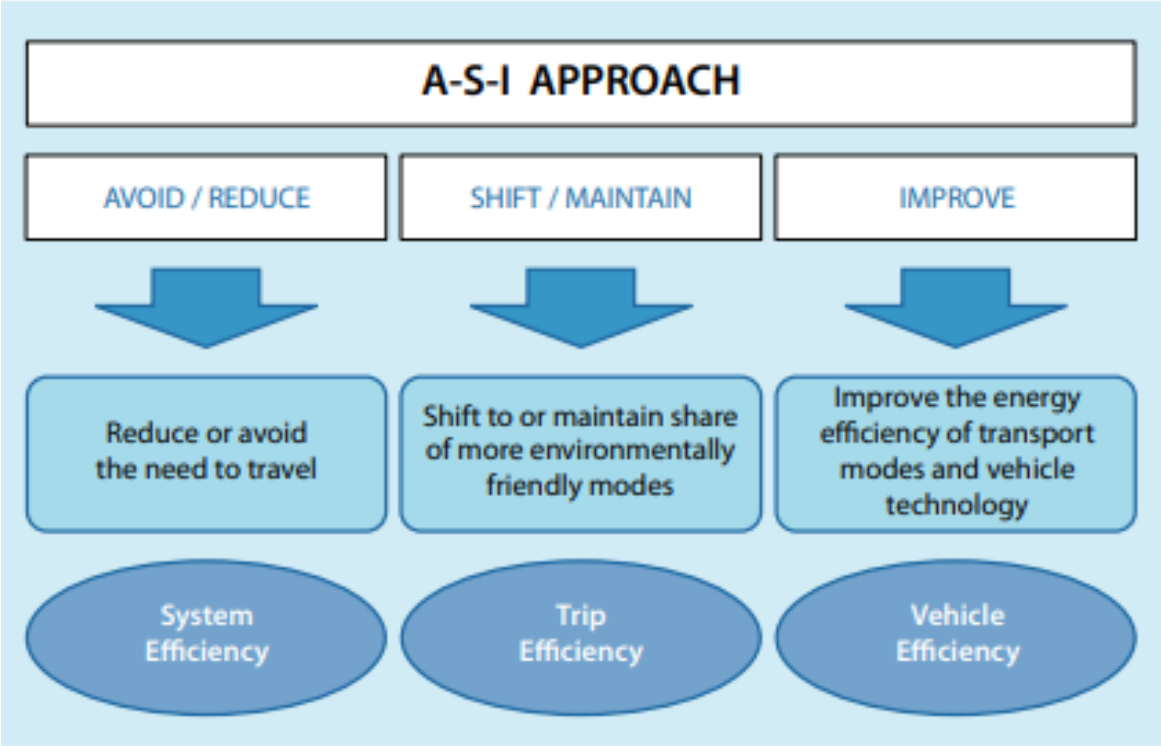
Significant gap against decarbonisation pathways



Under the ZEV-focused scenarios, emissions reductions are forecast to accelerate in the 2030s, but there is a significant gap against the CCC 6th Carbon Budget and the Government's NZS Strategy, even under the Local Accelerated ZEV Strategy.

The CCC 6th Carbon Budget requires steep reductions in emissions during the 2020s. But emissions are forecast to remain stubbornly high.

Avoid-Shift-Improve



The Avoid-Shift-Improve framework is an internationally recognised approach to decarbonising transport and is being widely used in local authorities across the UK.

The Carbon Playbook classifies policy measures using the Avoid-Shift-Improve framework, under a range of policy themes.

- Integrated planning policies (under 'Avoid')
- Active travel (under 'Shift')
- Public transport (under 'Shift')
- Parking, charging and traffic management (mainly under 'Shift')
- Technology (under 'Shift')
- Low emission vehicles (under 'Improve')
- Behaviour change (all three categories).

Source: Sustainable Urban Transport: Avoid-Shift-Improve (A-S-I) – SUTP

Estimating the impacts of different measures

- Reducing carbon requires reductions in:
  - Vehicle kilometres (through **Avoid** and **Switch** measures); or
  - Emissions per vehicle kilometre (through **Improve** measures).
- Evidence and assumptions on impacts of each measure are provided in the Playbook at Interventions – Carbon Assessment Playbook
- **Improve** measures: focused on enabling accelerated adoption of EV fleet.
  - Electric buses: calculations based on roll-out of zero emissions bus fleet.
  - EV charging infrastructure and corporate fleets: no evidence on impacts, so CAP assumes accelerate EV uptake by up to 1-2 years.
- **Avoid** and **Switch** measures: calculations on impacts on vehicle kilometres.
  - Evidence from ex-post evaluations of different policies: very limited in many cases.
  - Used a mode split model to estimate impacts of measures in different area types: ensures consistency in approach.

Benchmark traffic reductions

			All	Weekday	Weekday	Weekday	Weekday	Weekday	Weekday	Weekday	Weekday	Weekend	Weekend	Weekend	Weekend
			Employers Business	Commute	Commute	Commute	Commute	Other	Other	Other	Other	All	All	All	All
Theme	**Intervention**	**Avoid/ Shift/ Improve**	**All**	**Urban Large**	**Urban M+S**	**Rural 1 (Town & Fringe)**	**Rural 2 (Village & Dispersed)**	**Urban Large**	**Urban M+S**	**Rural 1 (Town & Fringe)**	**Rural 2 (Village & Dispersed)**	**Urban Large**	**Urban M+S**	**Rural 1 (Town & Fringe)**	**Rural 2 (Village & Dispersed)**
Active Travel	Improvements to cycling/scooting network and provision (including cycle parking & storage)	2 Shift	-0.1%	**-0.5%**	-0.1%	-0.3%	-0.3%	**-0.2%**	-0.1%	-0.1%	-0.1%	**-0.2%**	-0.1%	-0.1%	-0.1%
Active Travel	Improved pedestrian facilities and routes	2 Shift	0.0%	**-0.3%**	-0.2%	-0.1%	-0.1%	**-0.5%**	-0.4%	-0.2%	-0.2%	**-0.3%**	-0.2%	-0.1%	-0.1%
Active Travel	Bike/e-bike/e-scooter hire schemes	2 Shift	0.0%	**-0.2%**	-0.1%	-0.1%	-0.1%	**-0.1%**	-0.1%	0.0%	0.0%	**-0.1%**	0.0%	0.0%	0.0%
Behavioural Change	Support for/promotion of car sharing	1 Avoid	-8.9%	**-10.0%**	-7.0%	-6.5%	-6.5%	**-7.9%**	-7.2%	-6.3%	-6.3%	**-5.7%**	-5.1%	-3.6%	-3.6%
Behavioural Change	School Travel Plans & measures such as Safer Routes to School	2 Shift	0.0%	**0.0%**	0.0%	0.0%	0.0%	**-0.2%**	-0.2%	-0.1%	-0.1%	**0.0%**	0.0%	0.0%	0.0%
Behavioural Change	Business Travel Plans	3 Avoid / Shift	-12.1%	**-14.4%**	-9.8%	-9.3%	-9.3%	**0.0%**	0.0%	0.0%	0.0%	**-0.5%**	-0.3%	-0.3%	-0.3%
Behavioural Change	Area wide travel planning/mobility management	3 Avoid / Shift	-5.0%	**-6.1%**	-4.1%	-3.9%	-3.9%	**-4.7%**	-4.3%	-3.6%	-3.6%	**-3.3%**	-3.0%	-2.1%	-2.1%
Behavioural Change	Incentive-based apps to reward sustainable travel and off-peak travel behaviour (e.g. Better Points)	4 Shift / Improve	-0.8%	**-2.2%**	-1.4%	-1.3%	-1.3%	**-1.4%**	-1.4%	-1.2%	-1.2%	**-1.1%**	-1.0%	-0.7%	-0.7%
Behavioural Change	Support for/promotion of EV car clubs	6 Improve	-1.6%	**-2.0%**	-1.3%	-1.3%	-1.3%	**-1.6%**	-1.4%	-1.2%	-1.2%	**-1.1%**	-0.9%	-0.7%	-0.7%
Behavioural Change	Campaigns to support switch to cleaner, smaller, lower emission fleets for next vehicle purchases (including private cars & taxis)	6 Improve	0.0%	**0.0%**	0.0%	0.0%	0.0%	**0.0%**	0.0%	0.0%	0.0%	**0.0%**	0.0%	0.0%	0.0%
Integrated Planning Policy	20-Minute Neighbourhoods	3 Avoid / Shift	-8.9%	**-10.0%**	-7.0%	-6.5%	-6.5%	**-7.9%**	-7.2%	-6.3%	-6.3%	**-5.7%**	-5.1%	-3.6%	-3.6%
Integrated Planning Policy	Introduce mixed-use high-density developments located nearer to sustainable transport routes	3 Avoid / Shift	-3.3%	**-3.8%**	-2.6%	-2.4%	-2.4%	**-2.9%**	-2.6%	-2.3%	-2.3%	**-2.0%**	-1.8%	-1.3%	-1.3%
Low Emission Vehicles	Encouraging a switch to low emission public transport fleets	6 Improve	0.0%	**0.0%**	0.0%	0.0%	0.0%	**0.0%**	0.0%	0.0%	0.0%	**0.0%**	0.0%	0.0%	0.0%
Low Emission Vehicles	Provide and coordinate EV charging infrastructure (including booking systems)	6 Improve	0.0%	**0.0%**	0.0%	0.0%	0.0%	**0.0%**	0.0%	0.0%	0.0%	**0.0%**	0.0%	0.0%	0.0%
Low Emission Vehicles	Support EV uptake in corporate fleets	6 Improve	0.0%	**0.0%**	0.0%	0.0%	0.0%	**0.0%**	0.0%	0.0%	0.0%	**0.0%**	0.0%	0.0%	0.0%
Parking, Charging & Traffic Management	Consolidation centres/ distribution hubs including Drop-off collection points/ Pick up consolidation for home deliveries	1 Avoid	0.0%	**0.0%**	0.0%	0.0%	0.0%	**0.0%**	0.0%	0.0%	0.0%	**0.0%**	0.0%	0.0%	0.0%
Parking, Charging & Traffic Management	On-street parking measures: prices, controls, reduction in spaces	2 Shift	-7.0%	**-8.6%**	-5.8%	-5.5%	-5.5%	**-6.9%**	-6.2%	-5.2%	-5.2%	**-4.8%**	-4.2%	-3.0%	-3.0%
Parking, Charging & Traffic Management	Liveable Neighbourhoods and other reallocation of road space to public transport, active travel and other uses	2 Shift	-6.9%	**-8.4%**	-5.6%	-5.3%	-5.3%	**-6.8%**	-6.1%	-5.1%	-5.1%	**-4.8%**	-4.2%	-3.0%	-3.0%
Parking, Charging & Traffic Management	Workplace Parking Levy	2 Shift	-5.1%	**-6.4%**	-4.2%	-4.0%	-4.0%	**0.0%**	0.0%	0.0%	0.0%	**-0.3%**	-0.2%	-0.2%	-0.2%
Parking, Charging & Traffic Management	Off-street parking measures: prices, relocation to less central location and reduction in spaces	2 Shift	-3.3%	**-4.2%**	-2.7%	-2.6%	-2.6%	**-3.2%**	-2.9%	-2.4%	-2.4%	**-2.2%**	-2.0%	-1.4%	-1.4%
Parking, Charging & Traffic Management	Road user charging/tolls	5 Avoid / Shift / Improve	-4.8%	**-11.8%**	-8.2%	-7.9%	-7.9%	**-8.9%**	-8.2%	-7.1%	-7.1%	**-6.7%**	-6.2%	-4.3%	-4.3%
Parking, Charging & Traffic Management	Local cordon-based charges and restrictions (e.g. Clean Air Zones)	5 Avoid / Shift / Improve	-5.1%	**-6.4%**	-4.2%	-4.0%	-4.0%	**-5.0%**	-4.5%	-3.8%	-3.8%	**-3.5%**	-3.1%	-2.1%	-2.1%
Public Transport	Extended PT network - bus, BRT, tram	2 Shift	-8.9%	**-10.0%**	-7.0%	-6.5%	-6.5%	**-7.9%**	-7.2%	-6.3%	-6.3%	**-5.7%**	-5.1%	-3.6%	-3.6%
Public Transport	New rail stations/line reopening	2 Shift	-8.9%	**-10.0%**	-7.0%	-6.5%	-6.5%	**-7.9%**	-7.2%	-6.3%	-6.3%	**-5.7%**	-5.1%	-3.6%	-3.6%
Public Transport	Improved bus/LRT frequency	2 Shift	-3.3%	**-3.8%**	-2.6%	-2.4%	-2.4%	**-2.9%**	-2.6%	-2.3%	-2.3%	**-2.0%**	-1.8%	-1.3%	-1.3%
Public Transport	Mobility hubs & improved modal integration	2 Shift	-3.3%	**-3.8%**	-2.6%	-2.4%	-2.4%	**-2.9%**	-2.6%	-2.3%	-2.3%	**-2.0%**	-1.8%	-1.3%	-1.3%
Public Transport	Expansion and integration of demand responsive transport	2 Shift	0.0%	**-3.8%**	-2.6%	-2.4%	-2.4%	**-2.9%**	-2.6%	-2.3%	-2.3%	**-2.0%**	-1.8%	-1.3%	-1.3%
Public Transport	Reduced public transport fares	2 Shift	-3.3%	**-2.5%**	-1.8%	-1.6%	-1.6%	**-2.3%**	-2.1%	-1.9%	-1.9%	**-1.9%**	-1.7%	-1.2%	-1.2%
Public Transport	Bus priority measures	4 Shift / Improve	-4.6%	**-4.8%**	-3.3%	-3.0%	-3.0%	**-4.0%**	-3.6%	-3.2%	-3.2%	**-2.9%**	-2.6%	-1.8%	-1.8%
Technology	Integrated Ticketing, Passenger Information and Mobility as a Service	2 Shift	-1.6%	**-1.8%**	-1.2%	-1.2%	-1.2%	**-1.4%**	-1.3%	-1.1%	-1.1%	**-1.0%**	-0.9%	-0.6%	-0.6%

This table shows forecasts on vehicle-kilometres travelled (by car) of diverse transport policies.

Active travel schemes tend to have lower impacts on overall traffic volumes because they serve shorter trips.

School Travel Plans have low overall impacts on traffic volumes because they focus on short-distance education trips.

Business Travel Plans, if well-designed, these can deliver significant reductions in car traffic amongst the target population.

Road user charging schemes have the potential to deliver substantial mode shift and traffic reduction at an area-wide level.

Impacts of **public transport schemes** depend on the scale and level of priority delivered, and the scale of the population served.

Impacts of interventions

- The Playbook Report for Bath & North East Somerset identifies the interventions that could have the largest impacts on carbon emissions in Bath & North East Somerset, based on the evidence on impacts of different policy measures in different place types.

Intervention	Category	Reduction in Emissions ($MtCO_2$)		
		2030	2040	2050
LE2 • EV charging infrastructure	Improve	0.003	0.002	0.000
LE1 • Low emission public transport fleets	Improve	0.002	0.001	0.001
BC2 • EV car clubs	Shift	0.002	0.002	0.000
BC4 • Campaigns for switch to LEV fleets	Shift	0.002	0.001	0.000
BC6 • Support for car sharing	Avoid	0.002	0.001	0.000

- The total impact of these measures is estimated at ~0.011 MtCO2e in 2030. This compares with an estimated 0.19 MtCO2e under the local accelerated ZEV scenario, equivalent to a 5% reduction.
- **This is not enough to meet the Council's ambitions: much more is needed.**

Source: bath-and-north-east-somerset.pdf

What's needed in B&NES

- A vision-led approach, integrating a wider suite of avoid, shift and improve measures to dramatically reduce emissions.
- Identification of measures that can achieve an overall 25% reduction in veh-km per person.
- This requires application:
  - With impact (genuinely influencing travel choices)
  - At scale (impacting as many people as possible)
  - At speed (not dependent on expensive infrastructure)
- This means strong emphasis on behaviour change and rapid improvements to travel choices.
- Measures are needed in Bath, the towns, and the rural areas. These should include a focus on key movement corridors, including:
  - Bristol to Bath via Keynsham and Saltford
  - Midsomer Norton to Bath
  - Other corridors into Bath (from Warminster, BoA, Chippenham, South Glos)
  - Bristol to Mendips, and other rural corridors.

Application in the Movement Strategy

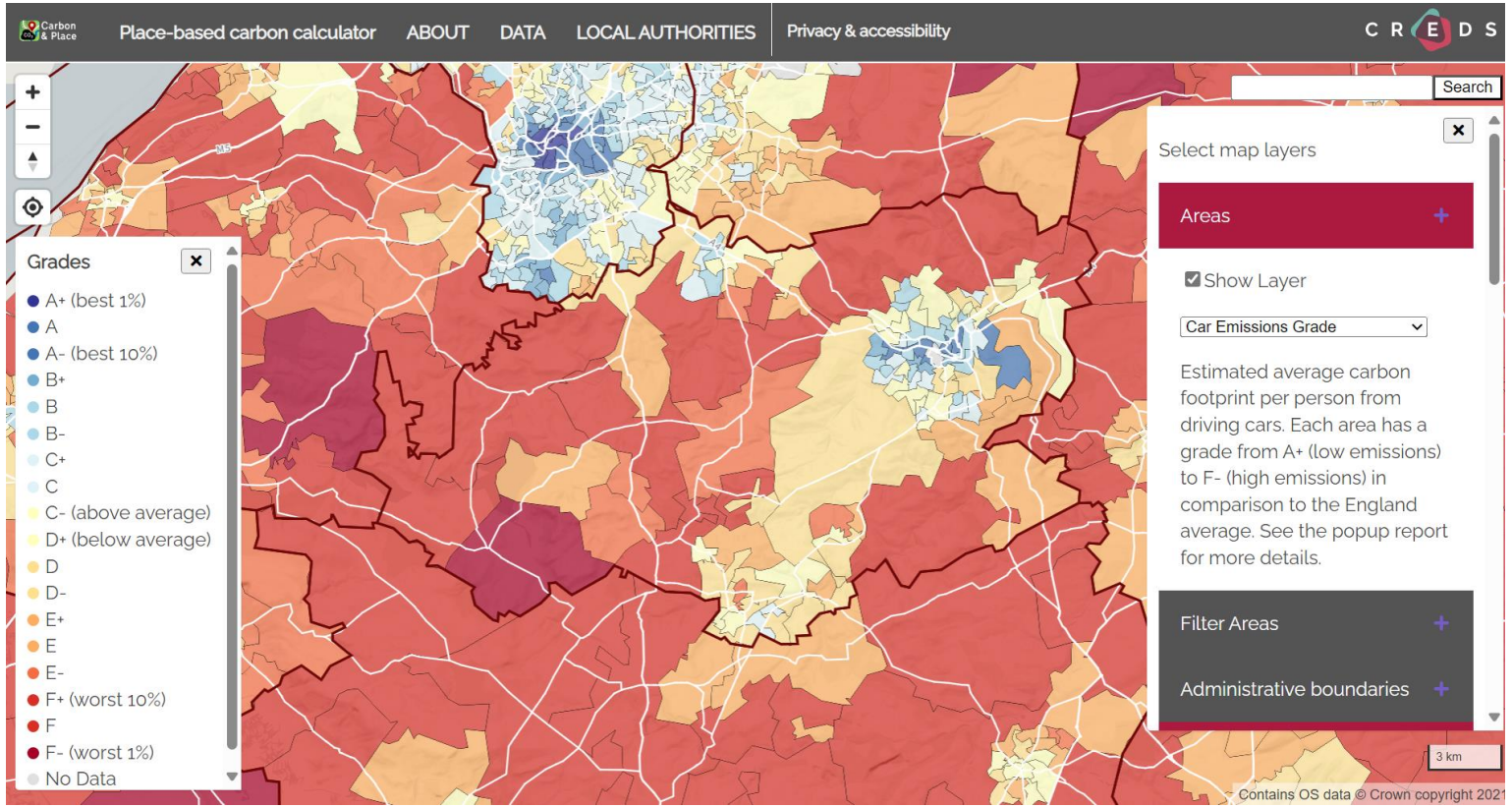
- Identified that the largest impacts are likely to be from:
  - Demand management: roadspace management, parking, WPL, other fiscal measures
  - Behaviour change programmes: business travel plans, car sharing
  - Improved public transport (higher frequencies, more bus priority)
- Carbon Playbook evidence suggests that active travel measures are likely to have more limited impacts. However, we can achieve much more in the unique context of Bath.
- The Playbook was a starting point, to assist in the scoping of more specific interventions for testing in the West of England Regional Transport Model (WERTM).
- WERTM is a more sophisticated modelling approach, with more detailed specification of parameters that influence mode split and car travel.
- Tests included combinations of active travel, major improvements to public transport, and increased costs for travel by car.
- Potential unintended consequences: risk of trips diverting to other places in the model (e.g. Trowbridge, South Glos). We must therefore take care in specification of measures.

Conclusions

- The Playbook is a useful tool in understanding the issues and to help in scoping of potential interventions.
- This can build on the work that B&NES has already undertaken: the Council has been one of the leading authorities in driving transport decarbonisation policy.
- The Playbook highlights the challenges in achieving the changes that will be needed to achieve the Council's ambitions.
- Measures will need to be applied in Bath, Keynsham, Norton Radstock, and the rural areas. These measures need to be tailored to the needs of each place. But they should be applied coherently to reflect the complex travel patterns across B&NES and the wider sub-region.
- It highlights that no single measure will achieve the Council's ambitions. In Bath, we need a combination of major improvements to community connections, public transport, and demand management to encourage mode shift to meet the ambitions for the city.

Further information

Carbon emissions per capita

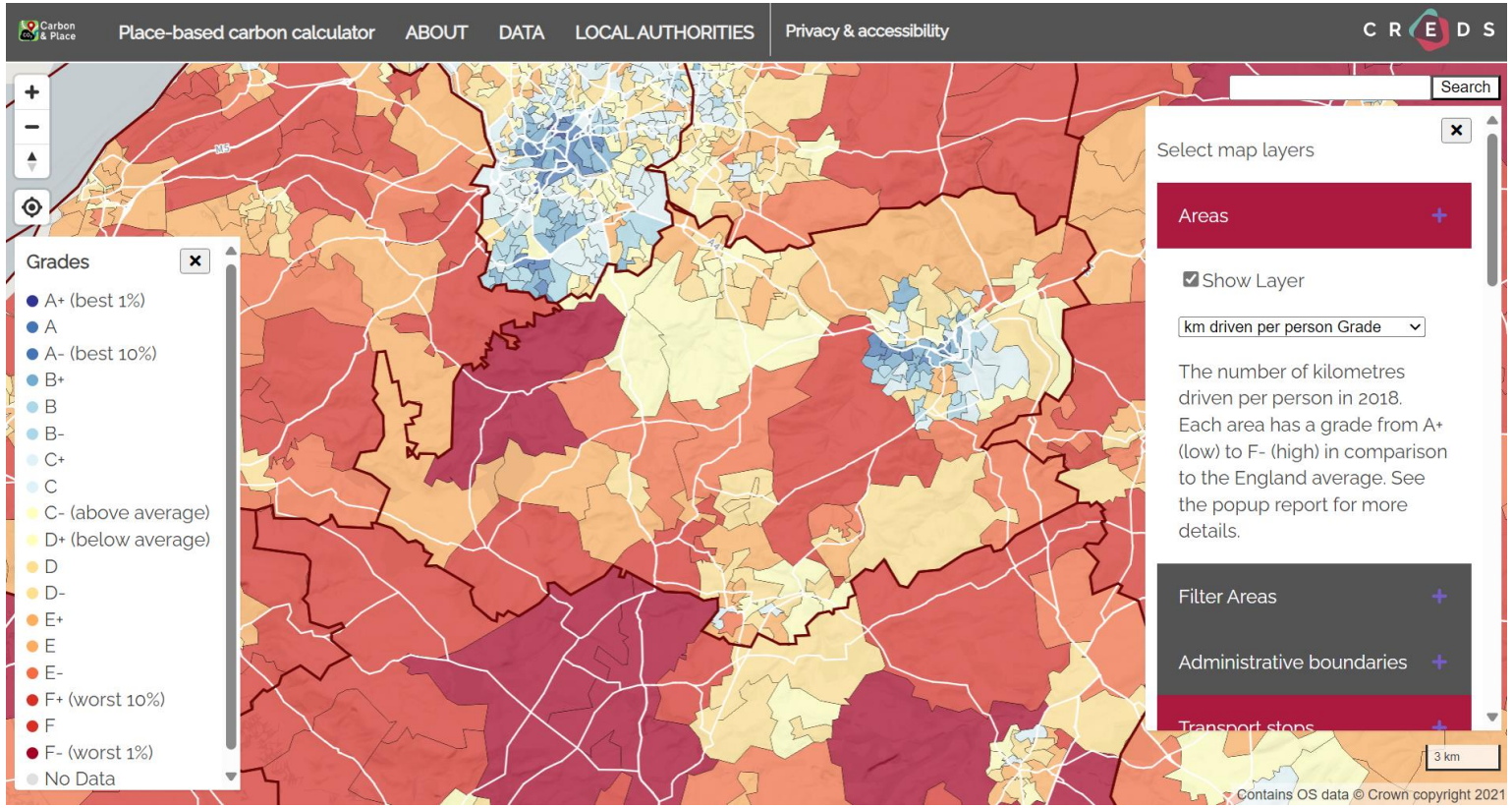


This map is sourced from a tool called the Place-based carbon calculator. It is useful in helping to visualise how transport carbon emissions vary in different areas. This map shows carbon emissions from driving cars, on a per capita basis, by residents in each area.

- Blue shading shows areas with the lowest emissions, red shading shows the highest emissions.
- The lowest emissions per capita in the region are in central Bristol. They are also low at the University of Bath (students living at Claverton Down) and in Central Bath.
- The highest emissions per capita are in the ‘deep rural’ areas, [e.g. The Harptrees). One factor is that people must travel further and there are very limited alternatives to the car. However, people could also be driving larger, more polluting vehicles.

Source: Place-based carbon calculator

Distance travelled by car per capita

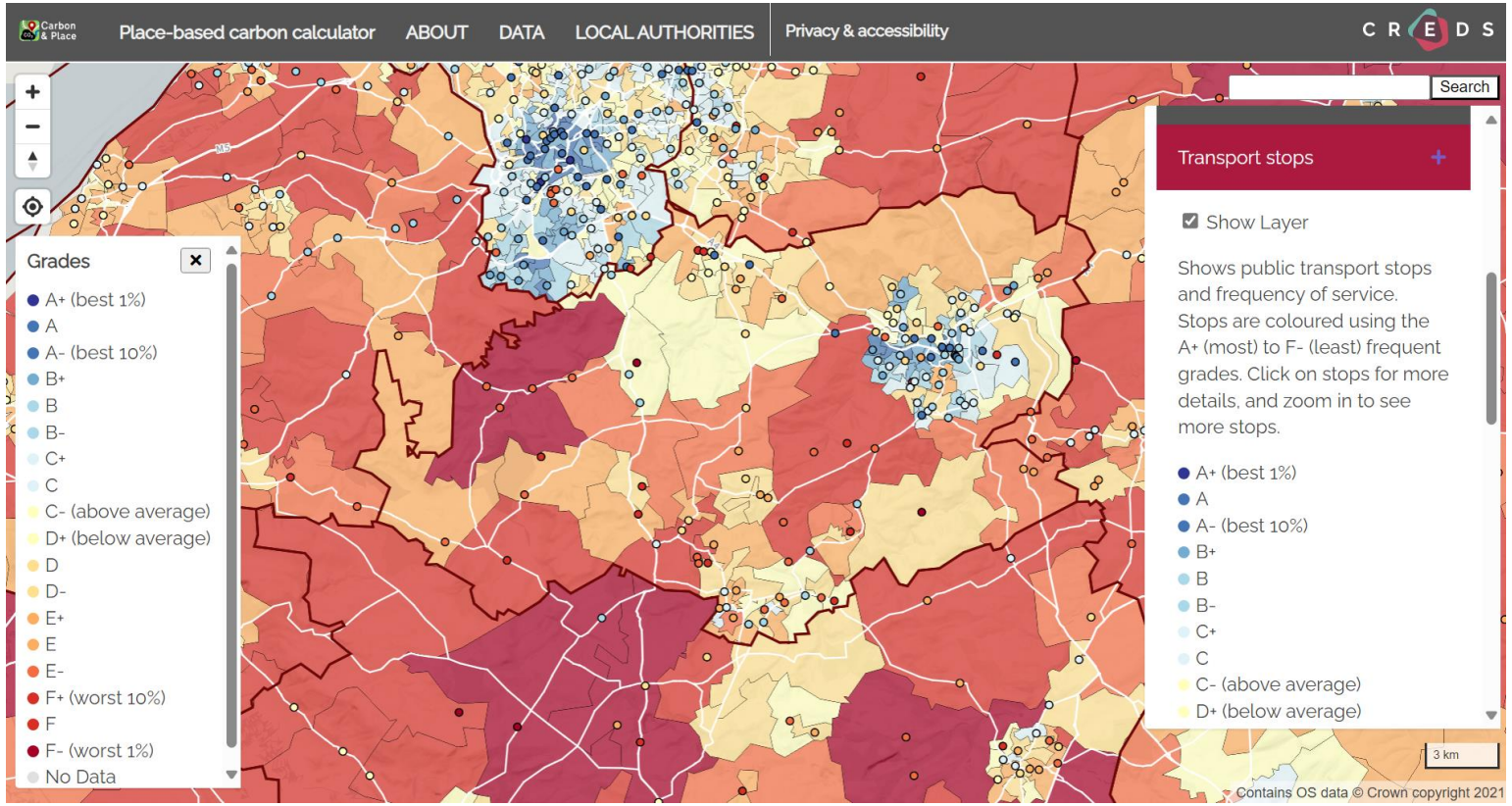


- Blue shading shows areas with the shortest distances travelled and red shading shows the longest distances.
- The shortest distances travelled per person in the region are in central Bristol. They are also low in areas along the main corridor into Bath from the west.
- The longest distances travelled per person are in the rural areas. Some of these are very close to Bristol (e.g. Chew Valley) and Bath (e.g. Inglesbatch].

One of the primary influences on emissions is the distance travelled by people living in different areas. This map shows the distance travelled per person, by residents in each area. This correlates broadly with the previous map (with some localised variations).

Source: Place-based carbon calculator

Influence of good travel options on car use



Availability of good public transport options, with frequent services to key destinations, is a key factor that influences people's travel options. This map takes the previous map and adds public transport frequencies at bus stops across the area.

Blue dots show stops with very frequent services and red dots show very infrequent services.

It is no surprise that there are significant differences between Bristol and the surrounding rural areas.

Bath has frequent services in the city centre, but less frequent services in other parts of the city.

The map also shows that there are reasonable levels of provision in Norton Radstock, and along the A4 Bristol-Bath corridor.

In general, there are very infrequent services in most of the rural areas. This is a key driver of local travel choices.

Source: Place-based carbon calculator