DecarboN8

Place-based decarbonisation for transport

Transport carbon emissions variation by local authority districts in England: Analysis of MOT test data

DecarboN8 working paper 2.1

UK Research and Innovation

Summary

1. This slidepack presents various analyses of the relative level of carbon emissions from cars in local authority districts in England, based on MoT test annual mileage data. The MoT data is from 2011, and where easily possible, the other data used is from 2011.

2. Slides 3-4 are reproduced from the companion slidepack "English local authority districts' transport carbon emissions: comparing NAEI and MoT test data" and establish the suitability of the MoT data for the analysis and the metric to use.

3. Slides 5-6 show the variability between districts according to the drivers of per head transport carbon emissions.

4. Slides 7-9 show different ways of categorising local authority districts and set out the finding that the best to use is the ONS Area Classification, which categorises places according to a combination of demographic and built environment characteristics.

5. Slides 10-12 show summary statistics for the eight ONS classification 'supergroups', including population, car ownership, deprivation, take up of cycling and walking (the latter not 2011 data).

6. **Appendix 1** (Slides 14-29) shows the 'league tables' of all 325 English districts for each of the 8 area type supergroups for performance on car carbon emissions per head. Slides 30-31 show a measure of the best and worst performing districts for emissions taking into account their level of car ownership.

7. **Appendix 2** (Slides 31-39) Analyses of emissions/head for the 72 North of England local authority districts.

Findings and recommendations

8. More analysis is needed but preliminary conclusions relevant to DfT's transport decarbonisation place-based solutions strategic priority include:
   - Although much of the variation between places in the same category is due to demographic, economic and built environment characteristics, some proportion of it must be due to local authority planning & transport policies, and the 'transport culture' developed in places. This is the space in which local policy and initiative can make a difference.
   - There appears to be plenty of opportunity for pro-active levelling up of performance between comparable districts: why can't South Oxfordshire do as well as Tunbridge Wells; Reading as well as Oxford?
   - No excuses! A district's population density, deprivation level or car ownership rate gives context, but does not justify not acting.

Reliability of the MoT data for examining variation of emissions by local authority district

Data for England, 2011	MoT data	Published data	Data source
Licensed motor vehicles (m)		29.1	DfT VEH0105 (2011)
Licensed cars (m)	19.9	24.2	DfT VEH0105 (2011)
Total mileage driven by cars (bn)	145.3		
Total mileage driven by cars & taxis (bn)		206.5	DfT TRA0106 (2011)
Calculated CO2 emissions cars (m tonnes)	33.9		
CO2 emissions all road transport (m t)		100.0	NAEI 2011 (all road types)

The NAEI figure for total emissions is almost 3x the MoT figure for total emissions. The discrepancy is surely greater than that which can be explained by the 4.3m fewer cars in the MoT data plus emissions from taxis, buses and freight vehicles.

Type of LA	Population (m)	% share pop	MoT data car miles driven (bn)	% miles driven	MOT data car emissions (mt CO2)	% MOT car emissions	NAEI road tpt emissions (mt CO2)	% NAEI road tpt emissions
London Borough	8.17	15.4%	13.32	9.2%	3.30	9.7%	8.15	8.1%
Metropolitan District	11.47	21.6%	26.31	18.1%	5.93	17.5%	18.50	18.5%
Non-metropolitan District	21.25	40.1%	70.98	48.8%	16.65	49.1%	51.36	51.3%
Unitary Authority	12.11	22.8%	34.71	23.9%	8.02	23.6%	22.03	22.0%
England Total	53.01	100.0%	145.32	100.0%	33.90	100.0%	100.04	100.0%

However, the figures for the share of the total attributable to different types of local authorities is similar.

Conclusion: the MoT data looks reliable for analysing relative emissions levels.

An additional analysis that could be done to check this would be to compare the miles driven from the MoT data with the published stats on car mileage by local highway authority area in DfT TRA8902.
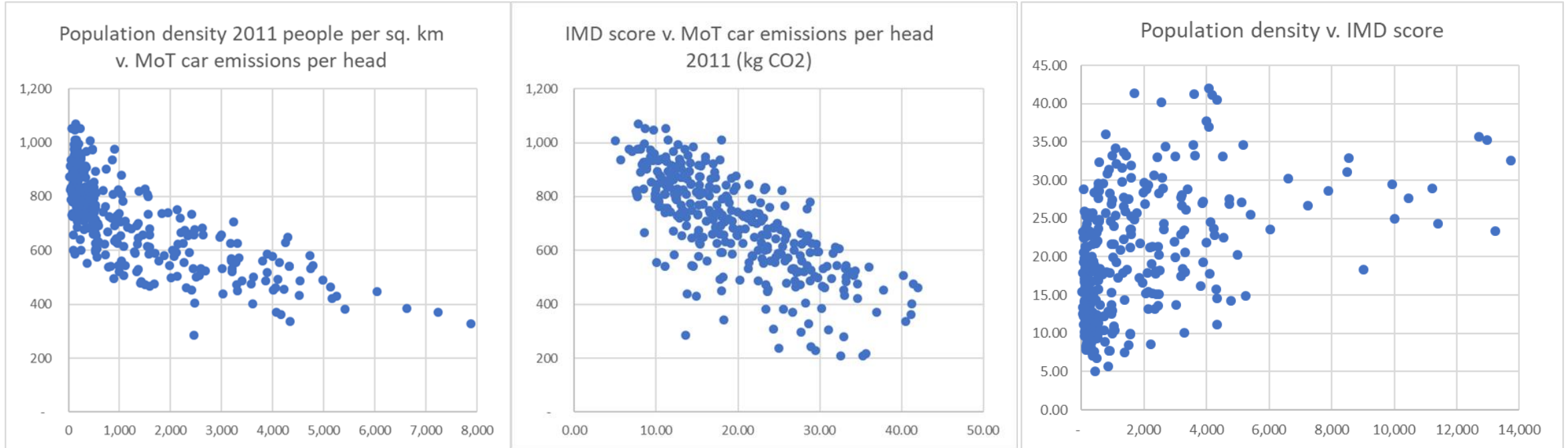
Total emissions and emissions per head

English districts by population, 2011	
Top 12 districts	Pop (2011)
Birmingham	1,073,045
Leeds	751,485
Sheffield	552,698
Cornwall	532,273
Bradford	522,452
County Durham	513,242
Manchester	503,127
Wiltshire	470,981
Liverpool	466,415
Bristol, City of	428,234
Kirklees	422,458
Cheshire East	370,127

MoT data: car emissions 2011 (tonnes CO2e)	
Top 12 Districts	Emissions
Birmingham	487,650
Wiltshire	419,743
Cornwall	404,337
Leeds	397,397
County Durham	328,935
Cheshire East	286,993
Sheffield	261,684
Cheshire West and Chester	260,931
East Riding of Yorkshire	258,000
Shropshire	254,538
Bradford	252,405
Kirklees	237,607

MoT data car emissions/head 2011	
Top 12 Districts	kg CO2e
South Northamptonshire	1,071
Cotswold	1,054
East Hampshire	1,052
Uttlesford	1,047
Forest Heath	1,011
Stratford-on-Avon	1,009
Hart	1,008
South Oxfordshire	996
Mid Suffolk	994
Maldon	986
West Oxfordshire	978
Daventry	976

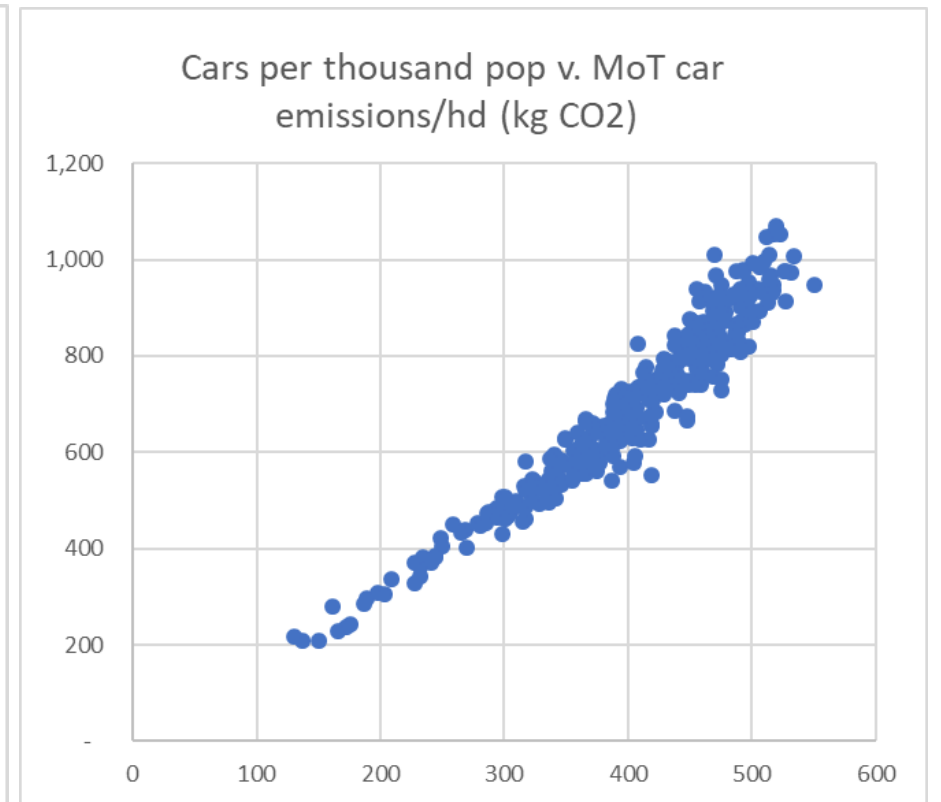- Although the absolute level of emissions is the only thing that matters for the climate, what the data top 12 districts by absolute level of emissions mainly shows, is the most populous districts. This is a fluke of how district boundaries are drawn, not a reliable list of where the most emissions arise.

- The better statistic to use when dealing with districts is **emissions per head of resident population**.

Drivers of per head transport carbon emissions (1)

- Population density and deprivation are two relatively independent variables which both have an inverse relationship with carbon emissions per head: on average, people living in places with a lower Index of Multiple Deprivation (IMD) score, or living at lower population density, emit more transport carbon.
- It follows that the top emitters are prosperous districts in the countryside, such as South Northamptonshire, Cotswold, East Hampshire - as shown on the previous slide.

Drivers of per head transport carbon emissions (2)

Population density 2017 people per sq. km v. cars registered per thousand people

IMD score v. cars registered per thousand people

Household car ownership -v- MOT miles driven per regd car per year

Cars per thousand pop v. MoT car emissions/hd (kg CO2)
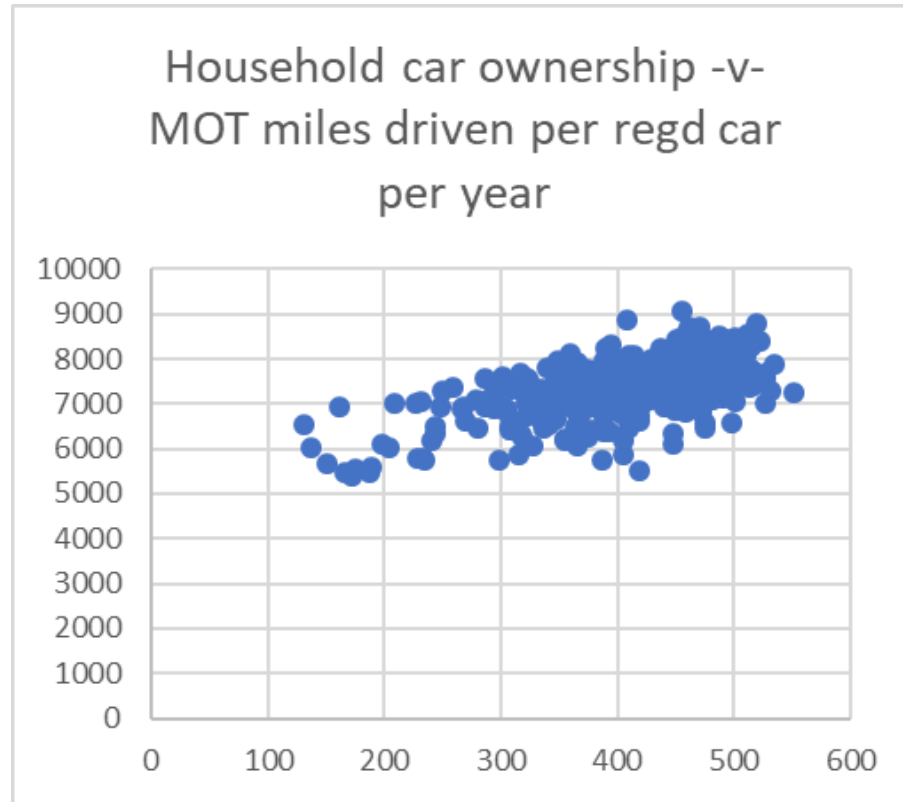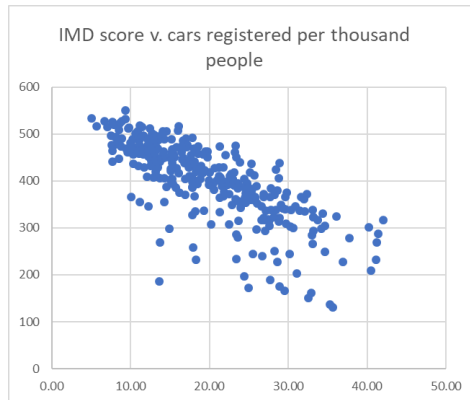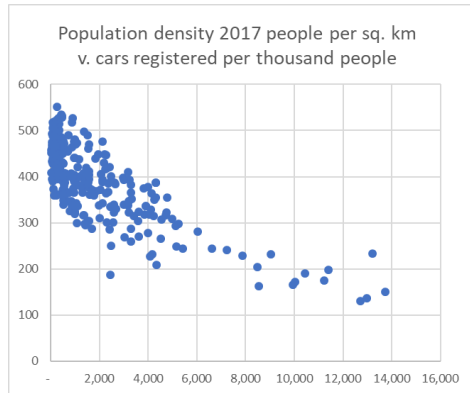
- The key driver of carbon emissions is household car ownership: people in places with a lower Index of Multiple Deprivation (IMD) score, or living at lower population density, buy more cars.

- Average miles per year per car does vary between districts, but by less than a factor of 2. Once people have paid the fixed cost of running a car, they tend to use it, even where it is the household's second or third car. Household car ownership (as number of cars per head) therefore has a close relationship with carbon emissions per head.

Categorising LA districts by type

By IMD score (NB maps show 2019)
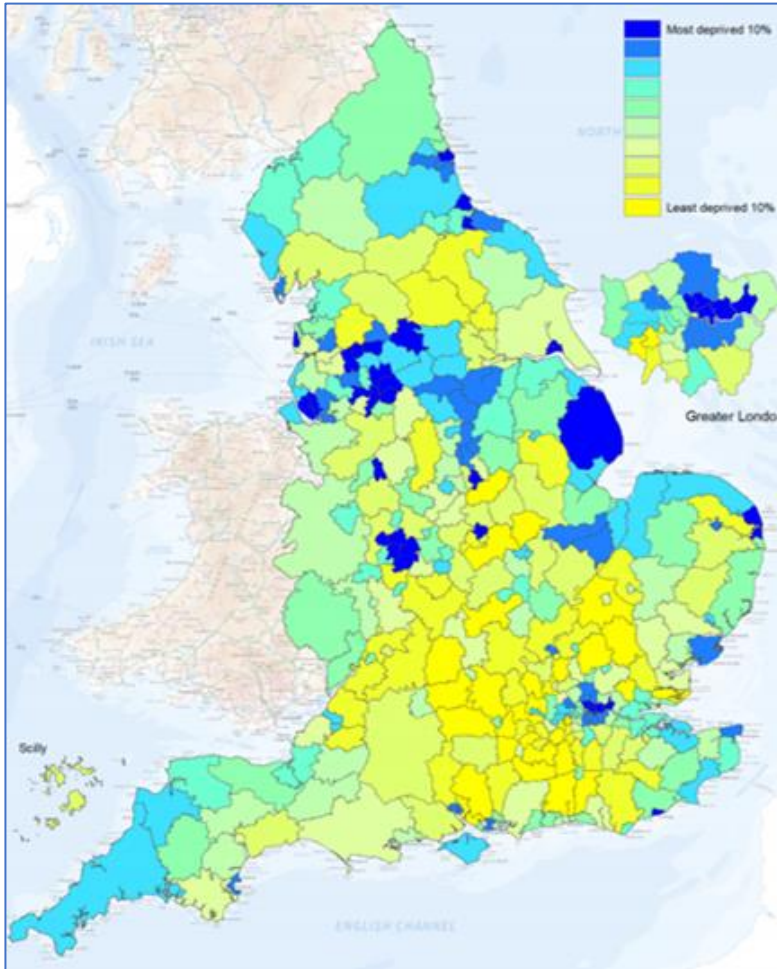
By population density
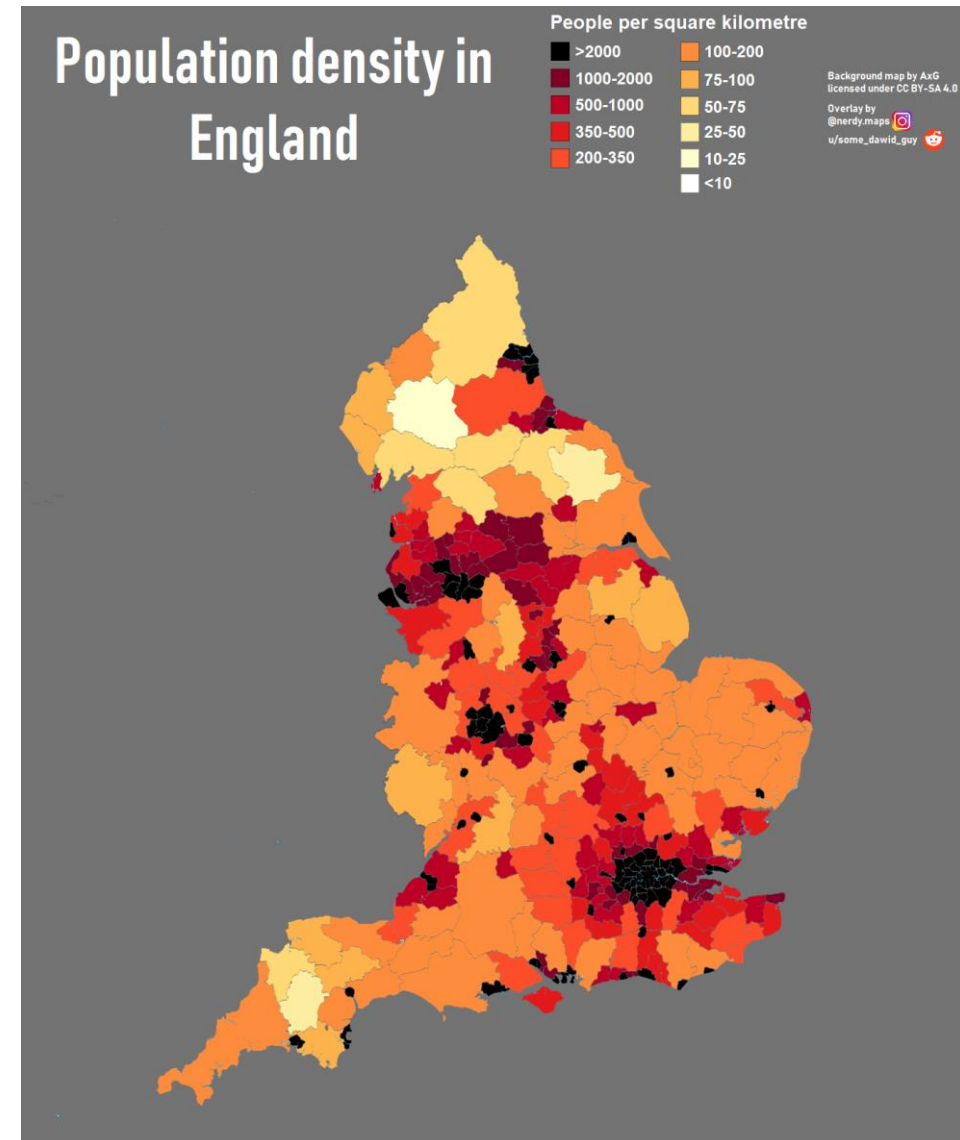
LA districts by type: by rural/urban classification

Rural/urban classification	London Boro	Met District	Shire Dist	Unitary	Total
1 Mainly rural (>80%)			46	3	49
2 Largely rural (50-79%)			34	7	41
3 Urban with significant rural			46	8	54
4 Urban with city and town		2	60	35	97
5 Urban with minor conurbation		4	4	1	9
6 Urban with major conurbation	33	30	11	1	75
Total	33	36	201	55	325

Rural/urban classification	Pop. 2017 (m)	Share of pop %	Share of emissions 2017 (kt CO2)	Tpt emissions/ head (tons CO2)
1 Mainly rural (>80%)	4.93	9%	15%	2.43
2 Largely rural (50-79%)	6.63	12%	17%	2.06
3 Urban with significant rural	7.18	13%	15%	1.69
4 Urban with city and town	14.73	26%	23%	1.25
5 Urban with minor conurbation	2.19	4%	3%	1.16
6 Urban with major conurbation	19.95	36%	25%	1.00
Total	55.62	100%	100%	1.41

(Data in the above table is for 2017)

The rural/urban classification of local authority districts offers a more sophisticated analysis of population density than simple population/sq km, based on analysis of settlements' built form.

This six-way classification shows that districts classified as 'rural' account for 21% of population and 32% of transport carbon. Districts classified as urban or rural outside the conurbations account for 60% of population and 72% of transport carbon.

However, a more suitable classification is available (see next slide).

Figure 5.4: Geographic footprint of RUCLAD classification

Mainly Rural (rural including Hub Towns)
Largely Rural (rural including Hub Towns)
Urban with Significant Rural (rural including Hub Towns)
Urban with City and Town
Urban with Minor Conurbation
Urban with Major Conurbation

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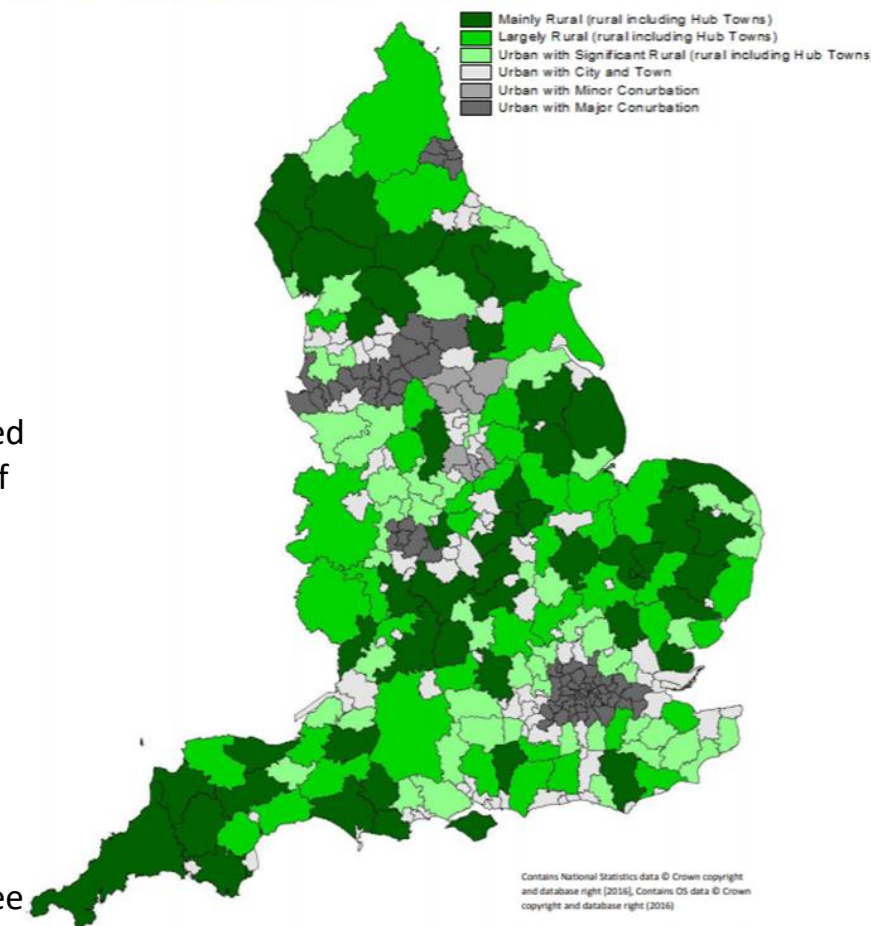
LA districts by type: ONS 2011 area classification

- It's not perfect but the best available categorisation for comparing transport carbon emissions is the Office for National Statistics' 'Area Classification for Local Authorities'.
  https://www.ons.gov.uk/methodology/geography/geographicalproducts/areaclassifications/2011areaclassifications

- It blends data on prosperity/ deprivation with data on the 'rurality'/ 'urbanity' of the settlements in which people live (amongst other demographic characteristics) to arrive at a categorisation for each local authority district.

- The eight-way 'supergroup' categorisation has been used for the rest of this paper.

- The objective of the exercise is to compare how districts are doing on transport carbon emissions compared to districts with similar area characteristics.

Supergroup[1]

- 1[r] – Affluent England
- 2[r] – Business, Education and Heritage Centres
- 3[r] – Countryside Living
- 4[r] – Ethnically Diverse Metropolitan Living
- 5[r] – London Cosmopolitan
- 6[r] – Services and Industrial Legacy
- 7[r] – Town and Country Living
- 8[r] – Urban Settlements
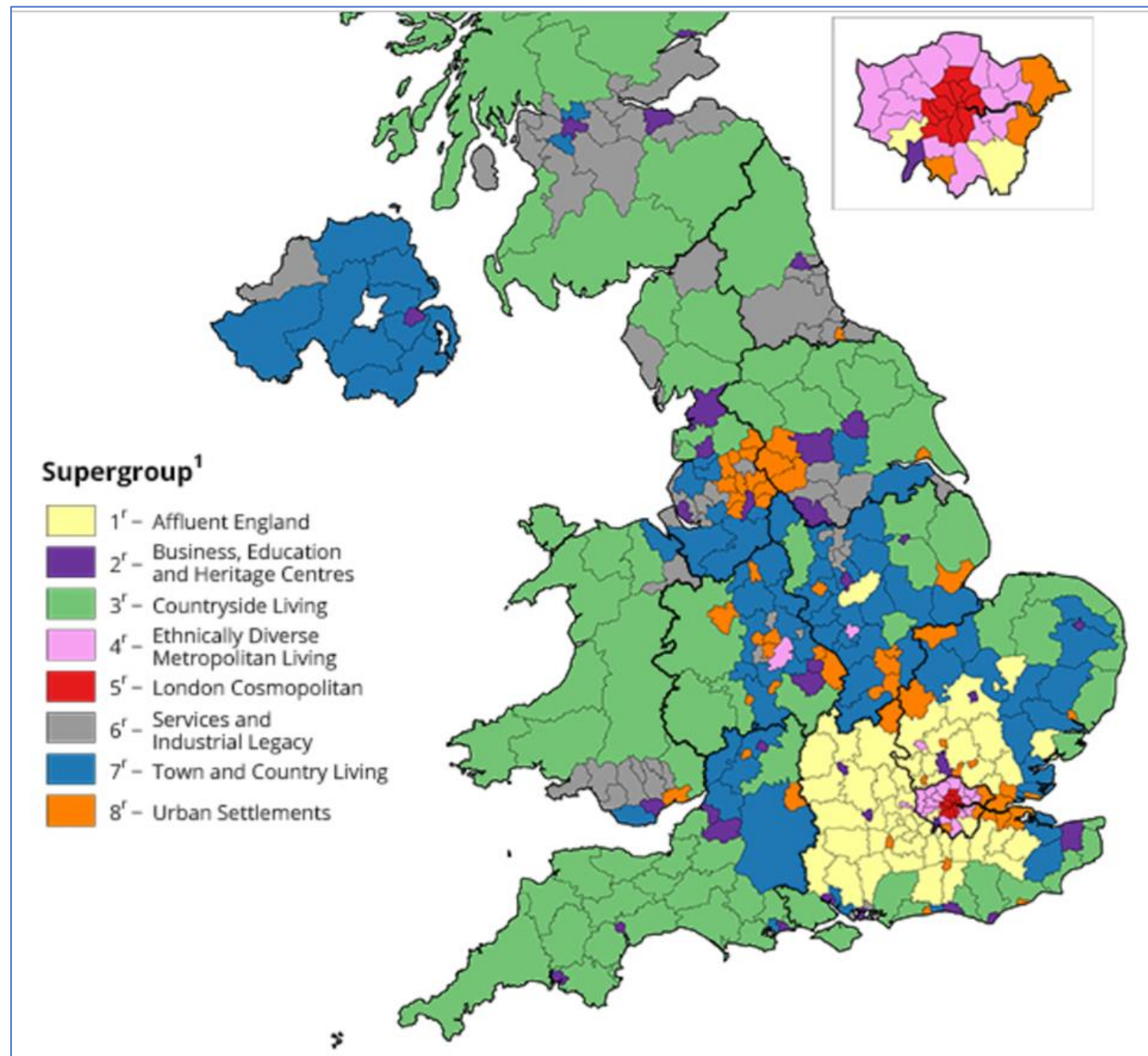
Emissions & characteristics by place type category

Area classification of districts	No. of dists	Avg car emissions /head (kg CO2)	Share of 2011 pop	Share of 2011 car emissions	Pop density (hd/sq km)	IMD score (2015)	Cars/thou res pop	Walk for travel 1x/mth 2018	Cycle for travel 1x/mth 2018
Affluent England	51	866	12.3%	16.4%	648	10	477	50%	8%
Countryside Living	62	811	14.0%	17.5%	256	18	455	40%	7%
Town and Country Living	64	804	15.3%	19.0%	524	15	452	41%	6%
Urban Settlements	54	615	17.7%	16.3%	1958	25	368	46%	6%
Services and Industrial Legacy	34	597	11.4%	10.6%	1409	27	362	41%	5%
Business, Education and Heritage Centres	29	529	13.1%	10.3%	2670	23	325	58%	14%
Ethnically Diverse Metropolitan Living	19	457	11.2%	7.9%	5185	25	287	59%	7%
London Cosmopolitan	12	272	5.0%	2.1%	10471	27	181	73%	17%
All English districts	**325**	**698**	**100.0%**	**100.0%**	**1654**	**19**	**402**	**47%**	**7%**

- A low IMD score indicates lower levels of deprivation and vice-versa. It doesn't give an indication of extremes of wealth and poverty: although 'London Cosmopolitan' and 'Industrial Legacy' districts average to the same score, they have quite different characteristics. Further analysis could also look at household income.

Variation in emissions within place type: the fruits of past policy – and the space for future action?

ONS area classification of districts	Min	Mean	Max	Range	Lowest	Highest
Affluent England	555	866	1052	496	Richmond-u-T	E Hampshire
Countryside Living	553	811	1054	500	Isle of Wight	Cotswold
Town and Country Living	626	804	1071	445	Stockport	S Northants
Urban Settlements	402	615	791	389	Hull	Wellingborough
Services and Industrial Legacy	461	597	721	261	S Tyneside	Havant
Business, Education and Heritage Centres	335	529	742	407	Manchester	Warwick
Ethnically Diverse Metropolitan Living	279	457	630	350	Newham	Slough
London Cosmopolitan	208	272	381	172	Hackney	Ken & Chelsea
All English districts	**208**	**698**	**1071**	**863**	**Hackney**	**S Northants**

- There remains a wide range of variation in emissions per head between districts allocated to the same area classification 'supergroup' according to its demographic and settlement type characteristics. This is partly because places are on a spectrum rather than really in eight neat categories, partly because of the way district boundaries are drawn, and partly because places in the same group genuinely are quite different in many ways.

- The key question is over the proportion of the variation which is a result of local authority planning & transport policies, and the 'transport culture' developed in places. This is the space in which local policy and initiative can make a difference.

Appendices

APPENDIX 1: 'League tables' of all 325 English districts, emissions/head

- Slides 13-27 set out the top and bottom 12 districts for each area classification supergroup for car emissions per head.

- Slides 28-29 show the top and bottom 12 districts for low/high carbon emissions relative to their population density and multiple deprivation score.

APPENDIX 2: Analyses of emissions/head for the 72 North of England local authority districts.

- Slides 31-39 provide a similar set of analyses and league tables, but with the analysis restricted to the 72 districts in the North of England.

Top 12 'Affluent England' districts for **low** car carbon emissions per head

District	LTA	2011 pop density (hd/sq km)	IMD - Average score (2015)	MoT data cars per thou res pop	MOT miles driven per regd car	Cars emissions/ head res pop 2011 (kg CO₂)	Walk for travel 1x/mth 2018	Cycle for travel 1x/mth 2018
Richmond upon Thames	London	3,281	10.0	366	6,057	**555**	71.8	21.4
Bromley	London	2,063	15.2	405	5,852	**579**	62.6	6.9
Epsom and Ewell	Surrey	2,209	8.5	448	6,121	**666**	56.3	11.2
Colchester	Essex	526	16.9	404	7,557	**716**	48.4	10.1
Hertsmere	Hertfordshire	990	12.9	440	6,951	**737**	51.6	3.8
Spelthorne	Surrey	2,124	13.2	476	6,588	**753**	49.7	9.5
Tunbridge Wells	Kent	348	11.0	433	7,265	**756**	51.6	6.1
Reigate and Banstead	Surrey	1,068	10.3	472	6,807	**782**	57.2	5.2
Brentwood	Essex	481	9.9	462	7,319	**792**	52.2	2.4
Chelmsford	Essex	496	12.4	450	7,494	**794**	46.1	9.9
Rushcliffe	Nottinghamshire	272	7.7	442	7,884	**800**	51.5	8.7
Epping Forest	Essex	368	15.3	468	7,117	**806**	49.7	4.9

Bottom 12 'Affluent England' districts for **high** car carbon emissions per head

District	LTA	2011 pop density (hd/sq km)	IMD - Average score (2015)	MoT data cars per thou res pop	MOT miles driven per regd car	Cars emissions/ head res pop 2011 (kg CO₂)	Walk for travel 1x/mth 2018	Cycle for travel 1x/mth 2018
Horsham	West Sussex	248	9.8	514	7,746	**958**	46.2	5.7
Waverley	Surrey	352	7.1	515	7,659	**967**	48.2	5.1
South Bucks	Buckinghamshire	474	9.3	532	7,296	**973**	42.8	6.1
South Cambridgeshire	Cambs & Peterboro CA	165	8.1	493	8,451	**975**	46.7	24.3
Chiltern	Buckinghamshire	473	6.7	528	7,558	**976**	51.3	6.7
Surrey Heath	Surrey	907	7.7	527	7,671	**976**	43.0	4.5
West Oxfordshire	Oxfordshire	147	8.1	493	8,327	**978**	47.1	9.0
South Oxfordshire	Oxfordshire	198	8.6	509	8,070	**996**	50.3	10.8
Hart	Hampshire	423	5.0	534	7,893	**1,008**	49.3	6.9
Forest Heath	Suffolk	158	18.0	469	8,559	**1,011**	37.8	9.0
Uttlesford	Essex	124	9.7	512	8,538	**1,047**	41.0	3.5
East Hampshire	Hampshire	225	8.6	523	8,394	**1,052**	39.9	7.4

Top 12 'business, education & heritage centre' districts for **low** car carbon emissions/head

District	LTA	2011 pop density (hd/sq km)	IMD - Average score (2015)	MoT data cars per thou res pop	MOT miles driven per regd car	Cars emissions/ head res pop 2011 (kg CO₂)	Walk for travel 1x/mth 2018	Cycle for travel 1x/mth 2018
Manchester	Greater Manchester	4,337	40.5	209	7,026	**335**	59.1	11.0
Liverpool	Liverpool City Region CA	4,164	41.1	232	7,045	**361**	58.1	8.4
Nottingham	Nottingham	4,076	36.9	227	6,997	**371**	56.7	10.2
Newcastle upon Tyne	North East JTB	2,479	28.3	250	7,283	**406**	56.9	10.9
Cambridge	Cambs & Peterboro CA	3,021	13.8	269	6,941	**440**	71.0	57.3
Oxford	Oxfordshire	3,302	17.9	259	7,353	**449**	73.0	37.9
Portsmouth	Portsmouth	5,126	27.1	294	6,900	**466**	63.9	17.7
Brighton and Hove	Brighton and Hove	3,294	23.4	286	6,922	**472**	63.9	17.6
Sheffield	South Yorkshire	1,502	27.6	304	6,890	**473**	54.2	6.0
Norwich	Norfolk	3,398	28.8	314	6,631	**486**	62.4	21.4
Exeter	Devon	2,506	18.2	336	6,614	**500**	67.6	19.6
Bristol, City of	West of England CA	3,893	27.2	336	6,646	**518**	63.5	20.5

Bottom 12 'business, education & heritage centre' districts for **high** car carbon emissions per head

District	LTA	2011 pop density (hd/sq km)	IMD - Average score (2015)	MoT data cars per thou res pop	MOT miles driven per regd car	Cars emissions/ head res pop 2011 (kg CO₂)	Walk for travel 1x/mth 2018	Cycle for travel 1x/mth 2018
Southampton	Southampton	4,738	26.9	322	7,029	**534**	59.4	9.0
Kingston upon Thames	London	4,326	11.1	355	6,176	**541**	70.9	14.9
Eastbourne	East Sussex	2,259	21.3	364	6,501	**554**	46.2	6.6
Bournemouth	Bmth-Chch-Poole	3,989	21.8	377	6,426	**577**	47.9	8.8
York	York	728	12.2	346	7,454	**583**	61.9	18.3
Reading	Reading	3,892	19.3	337	7,267	**586**	64.4	12.4
Lancaster	Lancashire	240	23.3	362	7,302	**601**	51.8	11.0
Cheltenham	Gloucestershire	2,462	15.1	401	6,991	**659**	55.6	14.0
Canterbury	Kent	489	16.9	371	7,631	**661**	55.9	8.5
Bath & NE Somerset	West of England CA	509	12.1	408	7,063	**671**	61.2	12.4
Welwyn Hatfield	Hertfordshire	850	12.9	407	7,348	**719**	51.0	7.2
Warwick	Warwickshire	486	11.7	429	7,496	**742**	47.6	10.6

Top 12 'countryside living' districts for **low** car carbon emissions per head

District	LTA	2011 pop density (hd/sq km)	IMD - Average score (2015)	MoT data cars per thou res pop	MOT miles driven per regd car	Cars emissions/ head res pop 2011 (kg CO	Walk for travel 1x/mth 2018	Cycle for travel 1x/mth 2018
Isle of Wight	Isle of Wight	364	23.1	419	5,506	**553**	47.0	6.4
Scarborough	North Yorkshire	133	25.2	359	7,168	**588**	41.2	7.2
Thanet	Kent	1,303	31.6	365	6,790	**590**	46.2	6.0
Torbay	Torbay	2,079	28.8	405	6,193	**591**	39.8	4.6
Great Yarmouth	Norfolk	559	32.4	373	6,882	**606**	40.2	5.6
Weymouth and Portland	Dorset	1,552	23.6	388	6,696	**616**	43.8	10.0
Waveney	Suffolk	311	25.1	418	6,957	**679**	38.9	10.6
Wyre	Lancashire	382	19.4	422	7,015	**684**	36.7	7.0
Folkestone & Hythe (Shepway)	Kent	302	22.8	395	7,677	**710**	48.9	11.1
Dover	Kent	355	21.6	397	7,785	**724**	48.7	6.9
North Devon	Devon	86	20.7	428	7,109	**725**	41.0	3.8
Christchurch	Bmth-Chch-Poole	955	12.5	476	6,473	**728**	43.3	10.4

Bottom 12 'countryside living' districts for **high** car carbon emissions per head

District	LTA	2011 pop density (hd/sq km)	IMD - Average score (2015)	MoT data cars per thou res pop	MOT miles driven per regd car	Cars emissions/ head res pop 2011 (kg CO₂)	Walk for travel 1x/mth 2018	Cycle for travel 1x/mth 2018
New Forest	Hampshire	234	12.4	513	7,372	910	45.2	12.5
Ryedale	North Yorkshire	34	15.5	457	8,527	913	37.0	8.1
Hambleton	North Yorkshire	68	12.7	469	8,569	917	38.4	4.1
Chichester	West Sussex	145	13.0	499	7,554	926	45.8	11.7
Wealden	East Sussex	179	11.2	516	7,395	930	40.2	5.3
Rutland	Rutland	98	9.6	462	8,699	933	33.0	4.1
West Devon	Devon	46	17.8	492	8,006	935	36.6	3.6
East Dorset	Dorset	246	9.3	551	7,232	948	32.0	5.7
Malvern Hills	Worcestershire	129	16.1	517	7,725	948	37.0	4.9
North Dorset	Dorset	113	13.9	498	8,028	954	39.6	4.1
Stratford-on-Avon	Warwickshire	123	11.4	515	8,265	1,009	36.9	7.2
Cotswold	Gloucestershire	71	11.2	518	8,430	1,054	40.6	6.0

Top 10 'ethnically diverse metropolitan living' districts for **low** car carbon emissions per head

District	LTA	2011 pop density (hd/sq km)	IMD - Average score (2015)	MoT data cars per thou res pop	MOT miles driven per regd car	Cars emissions/ head res pop 2011 (kg CO...)	Walk for travel 1x/mth 2018	Cycle for travel 1x/mth 2018
Newham	London	8,555	32.9	162	6,935	**279**	64.3	7.8
Lewisham	London	7,882	28.6	228	5,805	**328**	72.8	14.2
Brent	London	7,238	26.7	241	6,172	**371**	59.9	11.3
Greenwich	London	5,416	25.5	244	6,353	**382**	66.3	6.6
Waltham Forest	London	6,622	30.2	244	6,503	**384**	65.7	11.2
Barking and Dagenham	London	5,164	34.6	249	6,916	**422**	61.4	3.8
Merton	London	5,255	14.9	298	5,747	**429**	68.3	9.9
Leicester	Leicester	4,518	33.1	266	6,887	**433**	51.8	9.2
Ealing	London	6,044	23.6	281	6,445	**448**	70.9	10.0
Birmingham	West Midlands CA	4,004	37.8	278	7,094	**454**	54.5	7.3

Bottom 10 'ethnically diverse metropolitan living' districts for **high** car carbon emissions per head

District	LTA	2011 pop density (hd/sq km)	IMD - Average score (2015)	MoT data cars per thou res pop	MOT miles driven per regd car	Cars emissions/ head res pop 2011 (kg CO₂	Walk for travel 1x/mth 2018	Cycle for travel 1x/mth 2018
Birmingham	West Midlands CA	4,004	37.8	278	7,094	**454**	54.5	7.3
Croydon	London	4,225	23.6	315	5,872	**456**	61.6	5.4
Hounslow	London	4,535	22.5	308	6,413	**486**	61.3	9.1
Enfield	London	3,858	27.0	318	6,260	**488**	52.4	4.4
Redbridge	London	4,982	20.2	308	6,486	**490**	53.2	2.9
Barnet	London	4,096	17.8	328	6,065	**494**	60.1	3.3
Harrow	London	4,781	14.3	355	6,205	**544**	59.4	3.2
Luton	Luton	4,726	27.6	317	7,689	**580**	43.7	2.8
Hillingdon	London	2,362	18.1	367	6,714	**592**	54.4	4.9
Slough	Slough	4,249	22.9	349	7,697	**630**	44.0	5.0

The 13 'London cosmopolitan' districts in order of car carbon emissions per head, low to high

District	LTA	2011 pop density (hd/sq km)	IMD - Average score (2015)	MoT data cars per thou res pop	MOT miles driven per regd car	Cars emissions/ head res pop 2011 (kg CO₂)	Walk for travel 1x/mth 2018	Cycle for travel 1x/mth 2018
Hackney	London	12,962	35.3	137	6,035	**208**	75.3	23.3
Islington	London	13,742	32.5	150	5,653	**210**	73.2	24.3
Tower Hamlets	London	12,705	35.7	131	6,554	**216**	72.0	17.2
Southwark	London	9,941	29.5	166	5,481	**229**	71.8	24.3
Camden	London	10,015	25.0	172	5,379	**238**	72.7	15.7
Lambeth	London	11,225	28.9	175	5,552	**244**	75.6	16.7
City of London	London	2,458	13.6	186	5,459	**285**	82.5	9.9
Westminster	London	10,447	27.7	189	5,593	**298**	73.5	12.5
Haringey	London	8,498	31.0	203	6,030	**305**	69.9	11.1
Hammersmith and Fulham	London	11,406	24.4	197	6,107	**309**	65.9	18.0
Wandsworth	London	9,029	18.3	232	5,791	**342**	75.0	17.8
Kensington and Chelsea	London	13,221	23.4	234	5,739	**381**	65.2	11.3

Top 12 'services & industrial legacy' districts for **low** car carbon emissions per head

District	LTA	2011 pop density (hd/sq km)	IMD - Average score (2015)	MoT data cars per thou res pop	MOT miles driven per regd car	Cars emissions/ head res pop 2011 (kg CO₂)	Walk for travel 1x/mth 2018	Cycle for travel 1x/mth 2018
South Tyneside	North East JTB	2,314	30.6	300	6,917	**461**	41.7	4.9
Blackpool	Blackpool	4,059	42.0	317	6,339	**463**	42.2	4.7
Knowsley	Liverpool City Region CA	1,677	41.4	287	7,557	**475**	49.7	4.8
Gateshead	Gateshead	1,410	25.9	297	7,320	**479**	47.4	3.8
Barrow-in-Furness	Cumbria	886	31.4	336	6,465	**497**	45.7	6.4
Sunderland	North East JTB	2,011	29.7	310	7,325	**500**	46.5	4.4
North Tyneside	North East JTB	2,449	21.3	334	7,225	**531**	48.0	6.2
North East Lincolnshire	North East Lincolnshire	831	30.9	346	6,913	**540**	39.7	7.6
Hartlepool	Hartlepool	979	33.2	323	7,568	**544**	39.9	5.4
Sefton	Liverpool City Region CA	1,766	25.7	359	6,918	**562**	47.3	7.0
Dudley	West Midlands CA	3,193	23.0	393	6,396	**570**	44.8	2.8
Chesterfield	Derbyshire	1,573	25.3	376	6,925	**588**	43.2	2.4

Bottom 12 'services & industrial legacy' districts for **high** car carbon emissions per head

District	LTA	2011 pop density (hd/sq km)	IMD - Average score (2015)	MoT data cars per thou res pop	MOT miles driven per regd car	Cars emissions/ head res pop 2011 (kg CO₂)	Walk for travel 1x/mth 2018	Cycle for travel 1x/mth 2018
Doncaster	South Yorkshire	532	29.1	349	7,947	**627**	42.5	4.8
Gosport	Hampshire	3,305	20.6	382	7,086	**627**	47.7	14.6
Rotherham	South Yorkshire	896	28.3	371	7,490	**634**	38.4	2.5
County Durham	North East JTB	231	25.7	359	8,106	**641**	36.6	3.4
Stockton-on-Tees	Tees Valley CA	935	24.6	374	7,748	**643**	38.8	4.9
Redcar and Cleveland	Tees Valley CA	552	28.6	381	7,660	**656**	38.1	3.2
Copeland	Cumbria	96	25.9	390	7,633	**658**	36.1	4.3
Tamworth	Staffordshire	2,478	20.3	391	7,676	**679**	37.8	4.2
Cannock Chase	Staffordshire	1,234	20.9	401	7,434	**679**	38.0	3.9
Bolsover	Derbyshire	474	24.8	395	7,755	**701**	29.1	2.5
Rossendale	Lancashire	493	23.2	390	8,231	**720**	35.0	1.0
Havant	Hampshire	2,194	21.2	429	7,146	**721**	37.6	6.8

Top 12 'town and country living' districts for **low** car carbon emissions per head

District	LTA	2011 pop density (hd/sq km)	IMD - Average score (2015)	MoT data cars per thou res pop	MOT miles driven per regd car	Cars emissions/ head res pop 2011 (kg CO...)	Walk for travel 1x/mth 2018	Cycle for travel 1x/mth 2018
Stockport	Greater Manchester	2,248	19.1	416	6,622	**626**	50.9	6.1
Gedling	Nottinghamshire	946	15.3	404	6,775	**628**	50.2	5.0
Newcastle-under-Lyme	Staffordshire	587	18.5	394	7,123	**631**	39.4	4.6
Broxtowe	Nottinghamshire	1,369	14.3	407	6,972	**647**	50.2	13.6
Oadby and Wigston	Leicestershire	2,340	13.1	419	6,734	**654**	40.2	5.8
Erewash	Derbyshire	1,019	19.9	401	7,140	**655**	42.2	5.6
Adur	West Sussex	1,457	18.3	419	6,623	**658**	52.5	10.4
Poole	Bmth-Chch-Poole	2,271	15.2	448	6,327	**674**	48.0	9.3
Solihull	West Midlands CA	1,161	17.2	437	7,086	**687**	45.4	6.1
Charnwood	Leicestershire	595	13.7	406	7,374	**691**	42.0	8.7
High Peak	Derbyshire	169	16.1	416	7,382	**708**	44.3	7.0
Warrington	Warrington	1,117	19.3	420	7,548	**710**	46.5	7.4

Bottom 12 'town and country living' districts for **high** car carbon emissions per head

District	LTA	2011 pop density (hd/sq km)	IMD - Average score (2015)	MoT data cars per thou res pop	MOT miles driven per regd car	Cars emissions/ head res pop 2011 (kg CO	Walk for travel 1x/mth 2018	Cycle for travel 1x/mth 2018
Huntingdonshire	Cambs & Peterboro CA	187	11.8	466	8,532	**918**	44.8	8.9
Harborough	Leicestershire	144	8.3	481	8,180	**918**	42.2	7.4
Forest of Dean	Gloucestershire	156	17.0	490	7,933	**922**	34.3	5.4
East Northamptonshire	Northamptonshire	170	14.2	463	8,605	**925**	35.3	2.8
Wychavon	Worcestershire	176	16.0	507	7,921	**933**	37.7	7.3
Selby	North Yorkshire	139	12.9	456	9,080	**939**	37.3	7.7
Stroud	Gloucestershire	245	10.9	506	7,898	**940**	42.3	7.1
East Cambridgeshire	Cambs & Peterboro CA	129	12.1	471	8,726	**967**	42.5	11.3
Daventry	Northamptonshire	117	13.5	488	8,529	**976**	39.7	1.3
Maldon	Essex	172	14.5	507	8,065	**986**	37.3	5.6
Mid Suffolk	Suffolk	111	12.7	501	8,482	**994**	36.2	6.0
South Northamptonshire	Northamptonshire	134	7.8	520	8,770	**1,071**	36.0	4.2

Top 12 'urban settlements' districts for **low** car carbon emissions per head

District	LTA	2011 pop density (hd/sq km)	IMD - Average score (2015)	MoT data cars per thou res pop	MOT miles driven per regd car	Cars emissions/ head res pop 2011 (kg CO₂)	Walk for travel 1x/mth 2018	Cycle for travel 1x/mth 2018
Kingston upon Hull	Kingston upon Hull	3,611	41.2	270	6,607	**402**	53.8	10.7
Salford	Greater Manchester	2,412	33.0	285	7,049	**452**	49.5	6.9
Oldham	Greater Manchester	1,584	30.3	303	6,868	**467**	43.4	2.4
Sandwell	West Midlands CA	3,582	34.6	305	6,856	**476**	48.6	6.8
Bradford	West Yorkshire	1,427	33.2	294	7,251	**483**	44.8	5.1
Wolverhampton	West Midlands CA	3,616	33.2	323	6,724	**500**	46.1	4.0
Tameside	Greater Manchester	2,129	29.4	342	6,551	**505**	44.4	4.8
Blackburn with Darwen	Blackburn with Darwen	1,077	34.2	299	7,464	**506**	41.6	3.4
Middlesbrough	Tees Valley CA	2,563	40.2	301	7,614	**507**	37.6	6.0
Rochdale	Greater Manchester	1,340	33.7	317	7,329	**521**	41.5	3.2
Stoke-on-Trent	Stoke on Trent	2,678	34.4	331	7,077	**524**	42.7	3.5
Hastings	East Sussex	3,008	33.1	339	6,635	**532**	46.1	4.9

Bottom 12 'urban settlements' districts for **high** car carbon emissions per head

District	LTA	2011 pop density (hd/sq km)	IMD - Average score (2015)	MoT data cars per thou res pop	MOT miles driven per regd car	Cars emissions/ head res pop 2011 (kg CO₂)	Walk for travel 1x/mth 2018	Cycle for travel 1x/mth 2018
Telford and Wrekin	Telford and Wrekin	575	24.9	388	7,955	**701**	38.1	4.3
Gravesham	Kent	1,027	21.7	391	7,562	**706**	50.1	5.7
Stevenage	Hertfordshire	3,229	18.4	393	7,728	**707**	52.2	9.5
Thurrock	Thurrock	968	21.6	389	7,652	**711**	42.9	4.6
Milton Keynes	Milton Keynes	805	18.0	401	7,989	**726**	49.6	7.8
Rushmoor	Hampshire	2,405	15.1	421	7,561	**733**	47.6	5.7
Redditch	Worcestershire	1,560	21.2	411	7,883	**735**	39.5	3.4
Broxbourne	Hertfordshire	1,835	17.3	439	7,100	**736**	45.5	3.5
Bedford	Bedford	331	19.2	420	7,731	**748**	43.0	9.9
Rugby	Warwickshire	285	13.1	436	7,691	**770**	42.1	7.3
Kettering	Northamptonshire	401	18.9	432	7,898	**777**	40.6	2.9
Wellingborough	Northamptonshire	462	21.7	430	7,921	**791**	34.7	1.1

Places doing well: with relatively low emissions compared to their population density and affluence

Low compared to pop density

District	2011 pop density (hd/sq km)	Car emissions /head (kg CO₂)	Diff in rank
Carlisle	103	601	198
Scarborough	133	588	193
Copeland	96	658	173
Northumberland	63	732	147
North Devon	86	725	141
Lancaster	240	601	133
Allerdale	78	738	132
Isle of Wight	364	553	128
County Durham	231	641	118
Craven	47	788	113
Boston	177	687	109
High Peak	169	708	108

Low compared to affluence

District	IMD - Average score (2015)	Car emissions /head (kg CO2)	Diff in rank
City of London	13.6	285	223
Richmond upon Thames	10.0	555	216
Kingston upon Thames	11.1	541	209
Cambridge	13.8	440	201
Merton	14.9	429	189
Epsom and Ewell	8.5	666	172
York	12.2	583	170
Harrow	14.3	544	148
Sutton	14.6	542	146
Wandsworth	18.3	342	144
Oxford	17.9	449	138
Barnet	17.8	494	126

Low compared to affluence (excluding London boroughs)

District	IMD - Average score (2015)	Car emissions /head (kg CO2)	Diff in rank
Cambridge	13.8	440	201
Epsom and Ewell	8.5	666	172
York	12.2	583	170
Oxford	17.9	449	138
Bath & NE Somerset	12.1	671	124
Oadby and Wigston	13.1	654	112
Exeter	18.2	500	110
Rushcliffe	7.7	800	102
St Albans	7.7	807	98
Rochford	11.0	741	97
Broxtowe	14.3	647	96
Trafford	15.4	623	93

Places doing badly: with relatively high emissions compared to their population density and affluence

High compared to pop density

District	2011 pop density (/sq km)	Car emissions /head (kg CO₂)	Diff in rank
Stevenage	3,229	707	-103
Eastleigh	1,565	800	-109
Woking	1,550	807	-113
Elmbridge	1,378	821	-116
Windsor & Maidenhead	734	902	-122
Chiltern	473	976	-122
South Bucks	474	973	-122
Hart	423	1,008	-124
Fareham	1,508	827	-130
Bracknell Forest	1,039	879	-139
Wokingham	862	936	-148
Surrey Heath	907	976	-166

High compared to deprivation level

District	IMD - Average score (2015)	Car emissions/head (kg CO2)	Diff in rank
West Lindsey	19.2	868	-113
Swale	25.7	767	-120
North Norfolk	21.3	844	-124
Breckland	19.8	877	-127
West Devon	17.8	935	-129
Torridge	23.2	825	-129
King's Lynn & West Norfolk	23.4	831	-140
West Somerset	23.3	835	-140
Tendring	28.4	754	-142
Fenland	25.4	824	-155
Forest Heath	18.0	1,011	-156
East Lindsey	28.9	780	-160

Appendix 2: Analyses of emissions/head for the 72 North of England local authority districts

Variation between districts on car emissions per head

	12 Lowest Districts	kg CO2e
1	Manchester	335
2	Liverpool	361
3	Kingston upon Hull	402
4	Newcastle upon Tyne	406
5	Salford	452
6	South Tyneside	461
7	Blackpool	463
8	Oldham	467
9	Sheffield	473
10	Knowsley	475
11	Gateshead	479
12	Bradford	483

	Middle 12 Districts	kg CO2e
30	Bury	581
31	York	583
32	Scarborough	588
33	Wigan	590
34	Pendle	594
35	St. Helens	595
36	Wirral	600
37	Carlisle	601
38	Lancaster	601
39	Darlington	604
40	Halton	613
41	Trafford	623

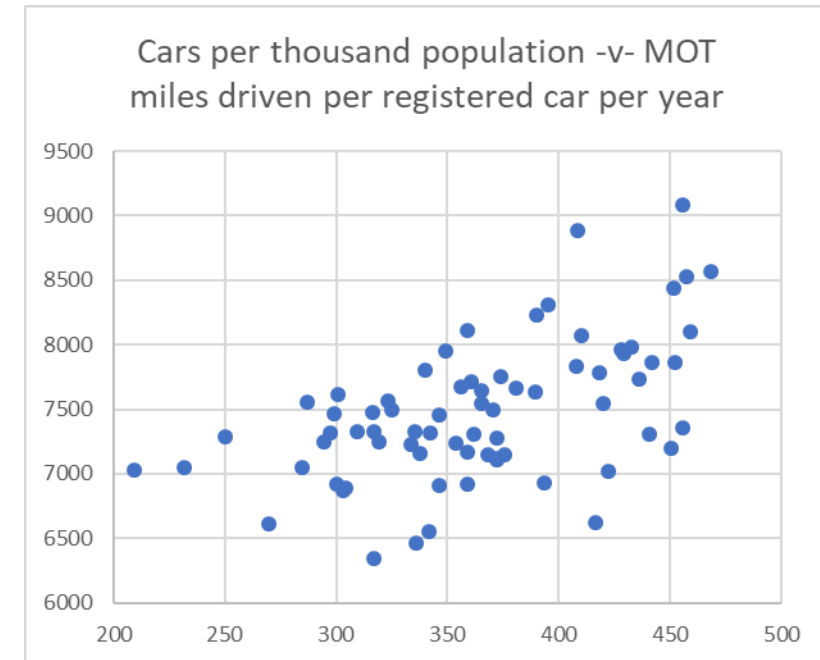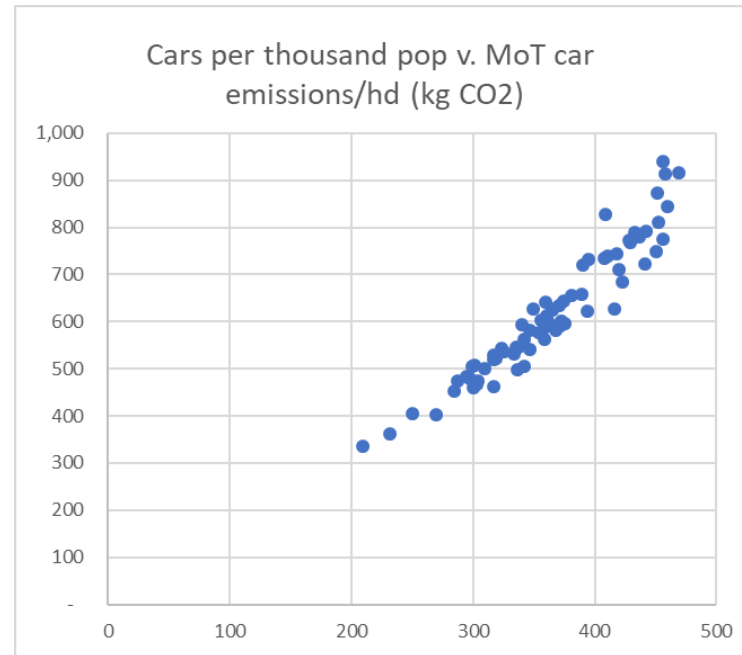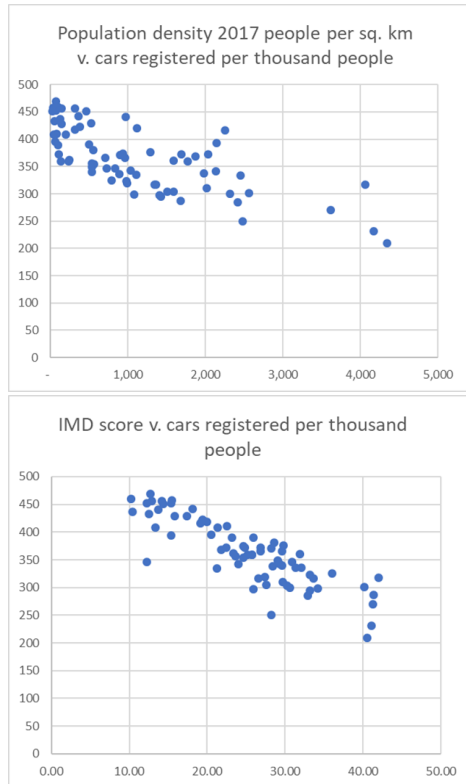|	12 Highest Districts	kg CO2e
61	East Riding of Yorkshire	772
62	Cheshire East	775
63	Harrogate	780
64	Craven	788
65	Cheshire West and Chester	792
66	South Lakeland	812
67	Richmondshire	827
68	Ribble Valley	844
69	Eden	874
70	Ryedale	913
71	Hambleton	917
72	Selby	939

- Car emissions per head of resident population vary widely between districts across the North, from 335kg/yr in the City of Manchester to 939kg/yr in Selby. The mean per head across the North as a whole is 582kg/yr. The average *district* of the 72 districts in the North is 619kg/yr.

- This compares with the average for England as a whole of 698kg/yr, varying between 208kg/yr in Hackney to 1,071kg/yr in South Northamptonshire.

- The data is for cars only, so carbon emissions from bus and taxi use are excluded.

Drivers of per head car carbon emissions (1)
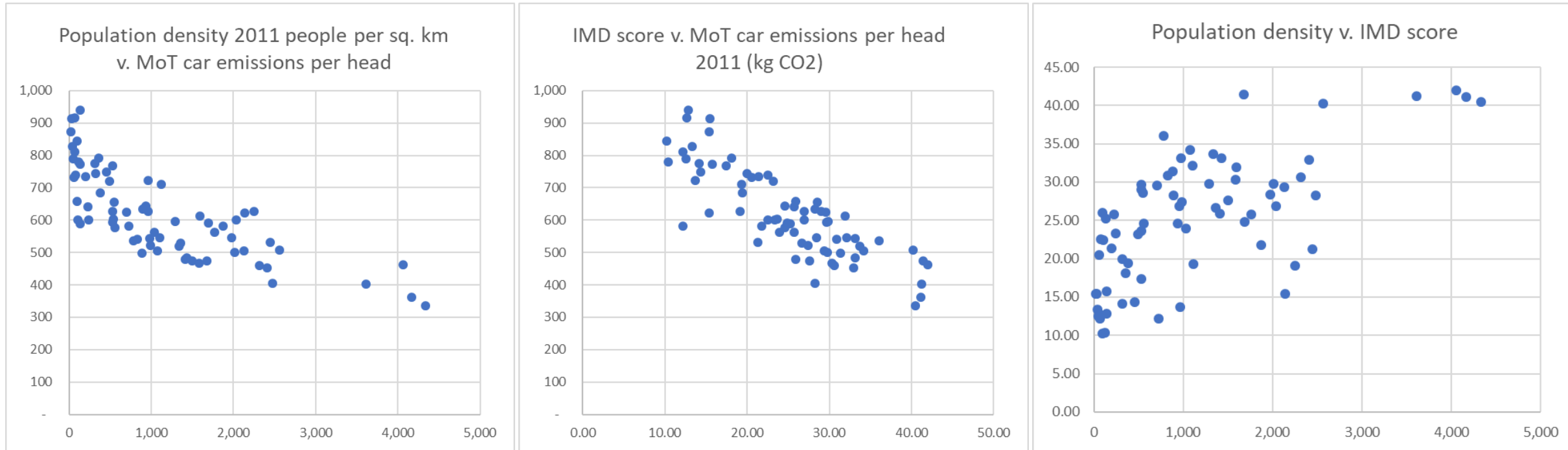
- Population density and deprivation are two relatively independent variables which both have an inverse relationship with carbon emissions per head: on average, people living in places with a lower Index of Multiple Deprivation (IMD) score, or living at lower population density, emit more carbon from their use of cars.
- It follows that the top emitters are prosperous districts in low population density countryside, such as Hambleton, Ryedale and Ribble Valley, as shown on the previous slide.

Drivers of per head car carbon emissions (2)

Population density 2017 people per sq. km v. cars registered per thousand people

IMD score v. cars registered per thousand people

Cars per thousand pop v. MoT car emissions/hd (kg CO2)

Cars per thousand population -v- MOT miles driven per registered car per year

- A key driver of carbon emissions is household car ownership: people in places with a lower Index of Multiple Deprivation (IMD) score, or living at lower population density, buy more cars.

- Average miles per year per car does vary between districts, from 6,300 to 9,100, but not in the way that might be expected. In districts with a high number of cars per head, the average number of miles each car is driven broadly tends to increase, despite the fact that in these districts more cars will be a household's second or third car.
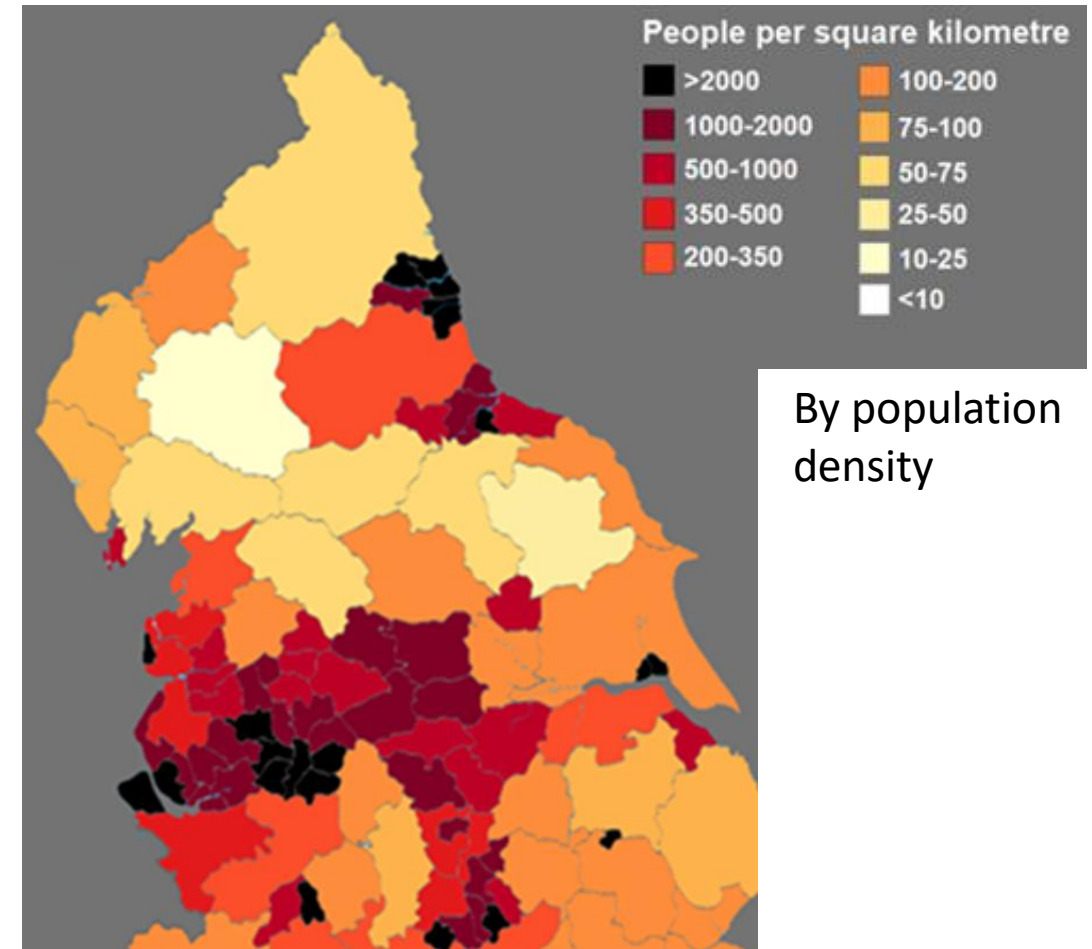
Categorising LA districts by type
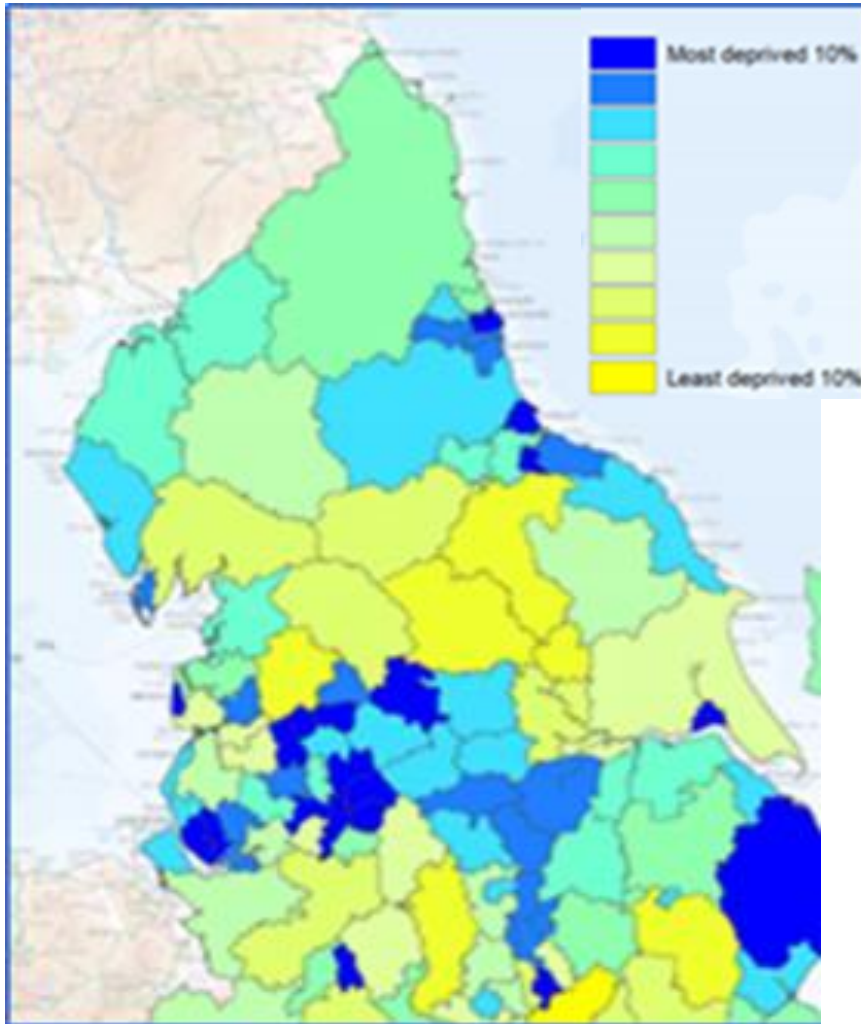
By categorising districts by their population density and prosperity/deprivation, we can compare the emissions performance of districts with similar characteristics. Do some districts have lower or higher emissions per head than we might 'expect'?

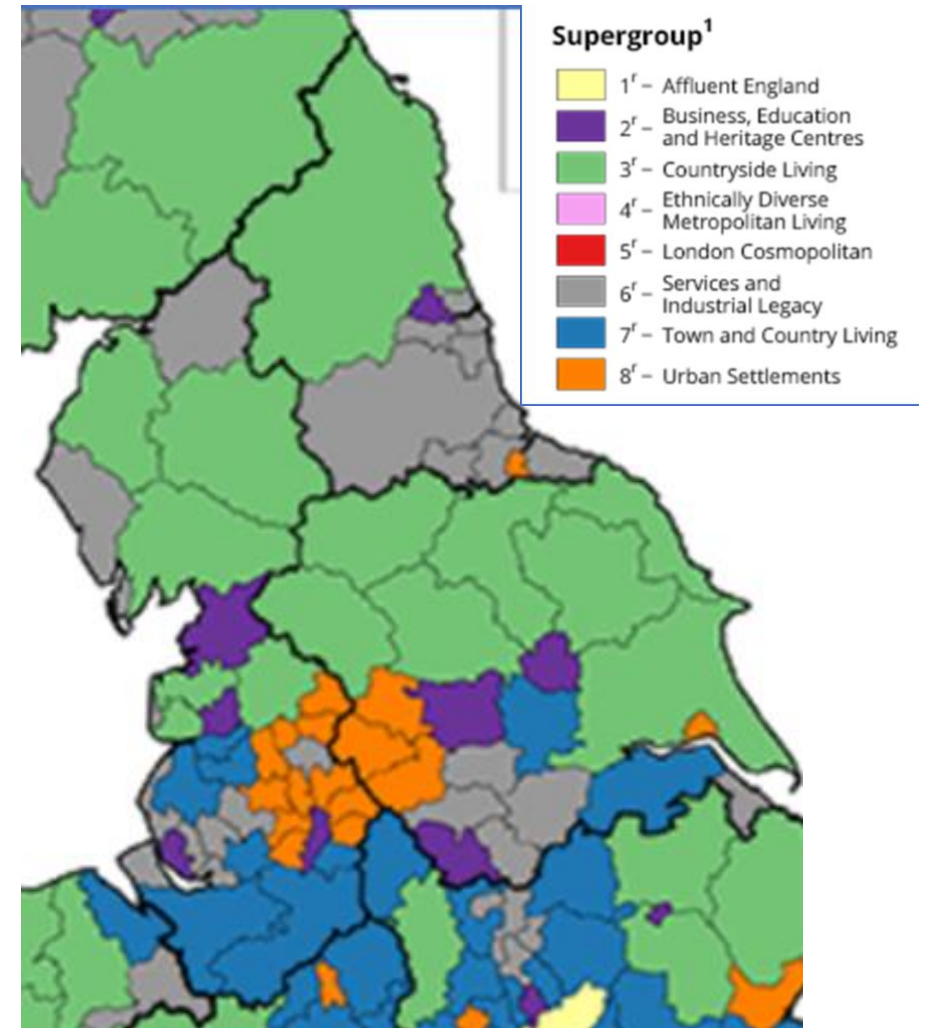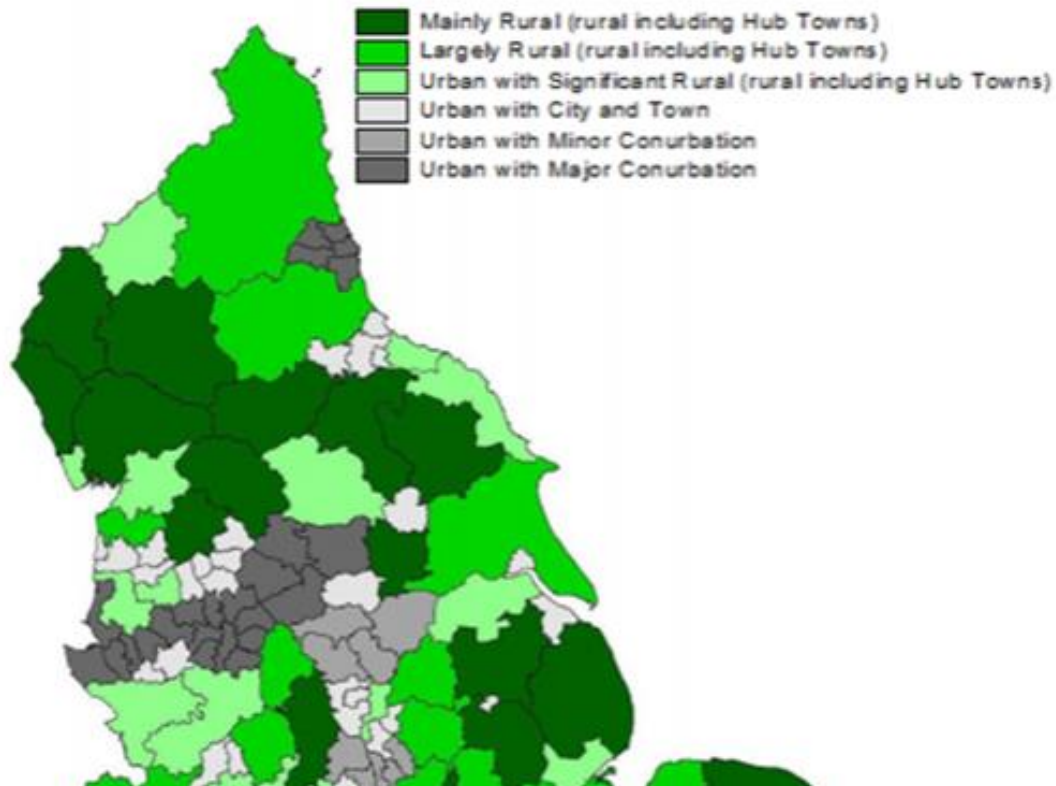What categorisation by type is the most useful?

By IMD score (NB maps show 2019)

By population density

LA districts: Defra rural/urban & ONS area classifications

The Defra rural/urban categorisation of LA districts (**RUCLAD**) looks at a small area sub-district level providing a better categorisation of districts by their population density characteristics than district-wide population per sq km.

The **ONS area classification** combines socio-economic, demographic and settlement-type elements to arrive at a categorisation of districts blending density and deprivation characteristics helpful to analysing car carbon emissions/head.

Legend (Defra):
- Mainly Rural (rural including Hub Towns)
- Largely Rural (rural including Hub Towns)
- Urban with Significant Rural (rural including Hub Towns)
- Urban with City and Town
- Urban with Minor Conurbation
- Urban with Major Conurbation

Supergroup[1]
- 1[r] – Affluent England
- 2[r] – Business, Education and Heritage Centres
- 3[r] – Countryside Living
- 4[r] – Ethnically Diverse Metropolitan Living
- 5[r] – London Cosmopolitan
- 6[r] – Services and Industrial Legacy
- 7[r] – Town and Country Living
- 8[r] – Urban Settlements

Population, miles driven and emissions by ONS area classification of district

Area classification of districts	No. of dists	2011 pop (m)	Car emissions 2011 (mt CO2)	Share of 2011 pop	Share of total car emissions	Avg car emissions /head 2011 (kg CO2)
Countryside Living	14	1.66	1.27	11.3%	14.8%	787
Town and Country Living	9	1.76	1.31	12.0%	15.3%	757
Services and Industrial Legacy	25	4.95	2.89	33.6%	33.7%	579
Urban Settlements	16	3.53	1.83	23.9%	21.3%	525
Business, Education and Heritage Centres	7	2.83	1.27	19.2%	14.8%	461
All districts in North of England	**71**	**14.73**	**8.58**	**100.0%**	**100.0%**	**619**

- The 'Countryside Living' districts in the North include the four national parks and other farming areas. They tend to have low deprivation. The 'Town & Country Living' districts cover 'exurban' areas of town and countryside on the edge of conurbations, such as Cheshire, West Lancashire and Selby. Both categories have above average car emissions/head.

- 'Services and Industrial Legacy' used to be called depressed areas, and include former coalfields plus steel, chemicals and fishing towns. The 'Urban Settlements' category in the North is a close fit with former mill towns. 'Business, Education and Heritage centres' include both core cities (regional commercial capitals) and historic cities. They are a close fit with the N8 group of universities. They tend to be high income but the core cities also have the worst concentrations of poverty and deprivation. They all have below average car emissions/head.

Average population density, car ownership, deprivation & cycling/walking take up by area type

Area classification of districts	Cars emissions /head (kg CO2)	Pop density (hd/ sq km)	Cars/thou res pop	IMD score (2015)	Walk for travel 1x/mth 2018	Cycle for travel 1x/mth 2018
Countryside Living	787	125	431	16	39%	6%
Town and Country Living	757	688	432	17	43%	6%
Services and Industrial Legacy	579	1241	351	29	42%	4%
Urban Settlements	525	1634	325	30	43%	5%
Business, Education and Heritage Centres	461	2153	285	31	55%	9%
All districts in North of England	**619**	**1129**	**365**	**25**	**43%**	**5%**

- The 'exurb' areas are hardly distinguishable from the 'true countryside' areas on average car ownership, deprivation and emissions. The university/core cities show significantly more walking and cycling than anywhere else.
- A low IMD score indicates lower levels of deprivation and vice-versa. It doesn't give an indication of extremes of wealth and poverty: although 'Business, Education & Heritage centres' and 'Services & Industrial Legacy' districts average to the same score, they have quite different characteristics. Further analysis could also look at age and household income.

Top 12 districts with relatively **low** car carbon emissions/head for their IMD score

District	2011 pop density (hd/sq km)	MoT data cars per thou res pop	IMD - Average score (2015)	MOT miles driven per regd car	Cars emissions /head res pop 2011 (kg CO	Walk for travel 1x/mth 2018	Cycle for travel 1x/mth 2018	Emiss- ions/ head rank	IMD rank	Diff IMD
York	728	346	12.2	7,454	**583**	61.9	18.3	31	70	39
North Tyneside	2,449	334	21.3	7,225	**531**	48.0	6.2	21	50	29
Gateshead	1,410	297	25.9	7,320	**479**	47.4	3.8	11	35	24
Newcastle upon Tyne	2,479	250	28.3	7,283	**406**	56.9	10.9	4	28	24
Sheffield	1,502	304	27.6	6,890	**473**	54.2	6.0	9	29	20
Trafford	2,138	394	15.4	6,933	**623**	54.7	9.9	41	61	20
Bury	1,869	368	21.8	7,146	**581**	44.3	4.2	30	48	18
Kirklees	1,033	342	24.0	7,313	**562**	44.2	4.5	28	42	14
Leeds	1,361	317	26.6	7,478	**529**	55.2	5.9	20	33	13
Calderdale	560	354	24.6	7,234	**577**	49.2	3.6	29	41	12
Preston	987	319	27.4	7,245	**522**	47.4	6.6	19	30	11
South Tyneside	2,314	300	30.6	6,917	**461**	41.7	4.9	6	17	11

- This analysis picks out districts that have quite low car ownership and use compared to their relative level of prosperity/ deprivation. Interestingly, it features districts on the Tyne & Wear Metro, Sheffield Supertram and Manchester Metrolink systems. However, some districts (eg Bury, Trafford) are also shown as doing badly compared to their population density, so can still improve. Further analysis of the relationship to high public transport use and active travel would be worthwhile.

Bottom 12 districts with relatively **high** car carbon emissions/head for their IMD score

District	2011 pop density (hd/sq km)	MoT data cars per thou res pop	IMD - Average score (2015)	MOT miles driven per regd car	Cars emissions/head res pop 2011 (k)	Walk for travel 1x/mth 2018	Cycle for travel 1x/mth 2018	Emissions/ head rank	IMD rank	Diff IMD
Middlesbrough	2,563	301	40.2	7,614	**507**	37.6	6.0	17	6	-11
Hyndburn	1,106	335	32.1	7,331	**545**	34.5	3.3	25	13	-12
Pendle	529	340	29.6	7,798	**594**	32.5	2.4	34	21	-13
Hartlepool	979	323	33.2	7,568	**544**	39.9	5.4	24	10	-14
Burnley	784	325	36.1	7,494	**537**	37.7	1.7	22	7	-15
Copeland	96	390	25.9	7,633	**658**	36.1	4.3	50	34	-16
St. Helens	1,289	376	29.8	7,149	**595**	44.5	2.4	35	19	-16
Rotherham	896	371	28.3	7,490	**634**	38.4	2.5	46	27	-19
Barnsley	703	366	29.6	7,546	**624**	40.2	3.1	42	22	-20
Doncaster	532	349	29.1	7,947	**627**	42.5	4.8	45	24	-21
Redcar and Cleveland	552	381	28.6	7,660	**656**	38.1	3.2	49	25	-24
Halton	1,592	361	31.9	7,709	**613**	37.9	4.6	40	14	-26

- This analysis picks out deprived areas that are using cars more than might be expected. It seems to identify places with town centres that have gone into severe decline. Matters for further investigation prompted by this table could include whether bus fares are too high compared to what people can afford, how higher take up of walking and cycling can be encouraged, and whether there is any scope for car clubs and other forms of shared ownership/collective provision.