Variations in car type, size, usage and emissions across Great Britain

Jo Barnes Air Quality Management Resource Centre Institute for Sustainability, Health and Environment UWE Bristol

Dr Tim Chatterton, Prof. J. Anable, Prof. R.E. Wilson, Dr Sally Cairns

















Engineering and Physical Sciences Research Council







University of the West of England



UK MOT (Ministry of Transport) test

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- MOT: the UK's annual safety inspection for all road vehicles older than 3 years
- Since 2005: the results have been captured and stored digitially
- In November 2010 the DfT published the first 5 years of this data online!!!

35 million vehicle tests each year

>160m datapoints



IMPORTANT CAVEATS!!!

- The location of the VTS not ideal proxy for the location of the owner of the vehicle.
- The dataset does not include the majority of vehicles <3 years of age
- Vehicles disappear after their last test, so an unknown mileage is driven between last test and when it is scrapped or taken off the road.
- Some vehicles will not have an MOT test and will therefore be driven on the roads illegally.
- The current dataset contains cars, Light Goods Vehicles, motorbikes and private buses. Our analysis has not yet differentiated between different vehicle types.





Project Outline





Who....not Where or Why?

Typically work on transport emissions focusses on *point of use*.....

Figure 1.4: Domestic transport CO2 emissions as carbon, UK, 2005



Images from DfT (2008). Carbon pathways analysis: informing development of a carbon reduction strategy for the transport sector. DfT, London.

Cars per Person (LLSOA 2011)

Cars per Household (LLSOA 2011)



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Emissions Profiles

Measure	NOx		PM ₁₀		CO2		Fuel Economy		Carbon	Calorific
	Min	Max	Min	Max	Min	Max	Min	Max	Content of Fuel	Value of Fuel
Units	g/km	g/k m	g/km	g/km	g/km	g/km	l/100 km	l/100k m	gCO₂/l	kWh/l
Petrol (66%)	0.02	2.97	0.002	0.008	263.8	104.8	4.2	12.6	2,392	9.14
Diesel (34%)	0.16	0.80	0.001	0.212	231.0	94.8	3.3	11.0	2,640	10.01
LPG (0.09%)	0.03	0.31	0.002	0.004	140.0	139.5	As Petrol		1,665	6.66
LNG (0.0001%)	As l	PG	As LPG		As LPG		As Petrol		As LPG	6.00
CNG (0.0002%)	As l	.PG	As LPG		156.5		6.9494		2,252	2.32
Hybrid (0.047%)	0.0	200	0.0021		22.8		5.1296		As Petrol	As Petrol
Electric (0.087%)	N/	/Α	N,	/A	70	0.0	1	N/A	N/A	N/A





Key Parameters from MOT Dataset



BRISTOL



BRISTOL

Relationships between Parameters





LDV Emissions by Post Code Area 2012



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Comparison with Road Transport Emissions (NAEI)





NOx Emissions from MOT Data



Relationship between CO₂ and key parameters





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From ONS Census 2011 and Experian



CO₂ Emissions and Soc-Dem Parameters





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BF



- The MOT dataset can reveal a number of interesting patterns within the *limited* vehicles it represents.
- Links to socio-demographic data provide a new perspective on emissions BUT significantly limited due to current spatial resolution.
- Potential for some revelation of longitudinal changes in car ownership patterns and their impacts.



 At this level of analysis – emissions most strongly linked to distance driven



- Investigation of outliers
- Vehicles <3 years old may be treatable through other datasets, or longitudinal tracking.
- Potential for improved datasets with location of registered keeper at finer scale, body-type, manufacturers emission and fuel consumption figures.
- Analysis with other transport datasets including DfT accessibility statistics and census travel to work data



Linking with household energy usage (gas and electricity) from DECC.



Those Vehicle Parameter Relationships

- The FURTHER people drive the LARGER the engine size
- The HIGHER the proportion of diesel vehicles the BETTER the fuel economy!
- The FURTHER people drive the HIGHER the proportion of diesel vehicles
- The HIGHER the density of vehicles the LOWER the % of diesel vehicles
- The HIGHER the density of vehicles the WORSE the fuel economy
- The NEWER the vehicles the BETTER the fuel economy
- The FURTHER people drive the NEWER the vehicles

The FURTHER people drive the HIGHER the CO₂