PUTTING PEOPLE AT THE HEART OF AIR QUALITY MANAGEMENT

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Summary

This paper will present an overview of a range of work that has focussed on developing a new paradigm for air quality management This will not only argue that developing a more social approach to air quality management is both desirable and necessary, but also how it is possible.

Introduction

One of the key reasons why efforts to improve air quality have not been more successful across Europe has been the failure to elicit more political support at both national and local levels. This can be seen as being due, in no small part, to a failure to capture sufficient public engagement to create the democratic mandate for significant action on air pollution. This has happened for a number of reasons. Partially, the 'successful' development of legislation through the Air Quality Framework and Daughter Directives and subsequent EU and national policies, has led to a set of numeric "$\mu g/m^3$" limit and target values that, whilst based on health evidence. In turn this has led to approaches to AQM based on abstract numbers, rather than real-world impacts. A second reason may lie in the absence of 'people' in models and scenarios used to estimate and predict air pollution concentrations. For example, these models represent the flows of cars along roads, and it requires a great leap of imagination to link these to the reasons for actual journeys that people make. The modelling of emission sources, not the human activity that results in them, leads to a bias in policy that focuses on mitigating emissions through technological change, not through human behaviour, and a reliance on technological innovation not social innovation.

Methodology and Results

The paper will illustrate this argument through a discussion of methods and outputs from a range of projects including:

- the EPSRC funded Disruption project which examined low carbon mobility (www.fleximobility.solutions) ;
- the EPSRC funded MOT project which has provided a new approach to attribution of emissions from point-of-use to vehicle owners;
- work being undertaken to support distributional impact assessments for three of the UK's proposed Clean Air Zones;
- The EU H2020 ClairCity (www.claircity.eu) project that is working with citizens to develop city policy scenarios that meet both air quality and climate change targets, and fulfil citizens' requirements for a high quality of life.
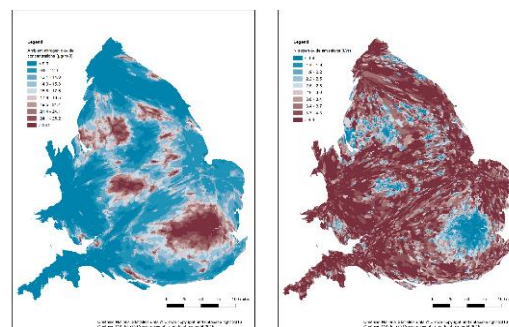

Fig.1 Differences between NO_2 concentrations, and NOx emissions allocated to vehicle keepers (RAC, 2017)

The methods employed vary from detailed data analysis and emissions calculations for over 30 million individual vehicles in the UK (MOT), microsimulation of behaviour to drive air quality modelling and source apportionment (ClairCity), focus groups and long-term social ethnography (Disruption), literature reviews and citizen and stakeholder engagement (ClairCity).

Conclusions

It has become clear that the tight focus on controlling exhaust emissions from cars has failed and will not be resolved in the near future. Also, there is a pressing need to align air quality management with other environmental (e.g. climate change) and health (e.g. obesity) challenges. To properly understand how to reduce polluting activity, we need to much better engage with why people appear to be locked into activities that pollute.
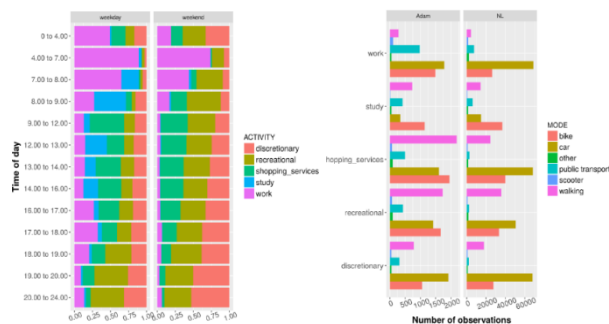
Acknowledgement

Fig.2 How activity determines time and mode of transport and therefore emissions

References:

Cairns S, Anable J, Chatterton T, Wilson RE and Morton C (2017) MOToring Along: The lives of cars seen through licensing and test data. RAC Foundation, London.

ClairCity

Putting People at the Heart of Air Quality Management

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with

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www.claircity.eu

@ClairCity

UWE Bristol | University of the West of England

What this is about....

- 20+ years of Air Quality Management policy have still left many areas of Europe with polluted air

- There has been a lack of interaction between AQM research, policy and practice and the social sciences

- The work presented here makes a significant advance in two key elements:

  - It moves beyond many conventional approaches to behaviour based on individual choice

  - It integrates social science with quantitative aspects of AQM

- The proposed social approach should be seen as *complementary* to existing AQM

Presentation

- A new approach to Air Quality Management

- Moving from "What and Where" to include "Who and Why"

- Why? The role of social activities

- Who? Differentials between the polluters and the polluted

- Summary

http://MOTproject.net

EPSRC
Engineering and Physical Sciences
Research Council

RESEARCH COUNCILS'
energy
PROGRAMME

MOT

Motoring and Vehicle Ownership Trends in the UK

Department for Transport

Department of Energy & Climate Change

ClairCity

UNIVERSITY OF LEEDS

UWE BRISTOL
University of the West of England

TRL

University of BRISTOL

UCL

Citizen Led Air pollution Reduction in Cities

2012-16

http://www.claircity.eu/

Disruption
unlocking low carbon travel

EPSRC
Engineering and Physical Sciences
Research Council

RESEARCH COUNCILS'
energy
PROGRAMME

UNIVERSITY OF LEEDS

UNIVERSITY of ABERDEEN
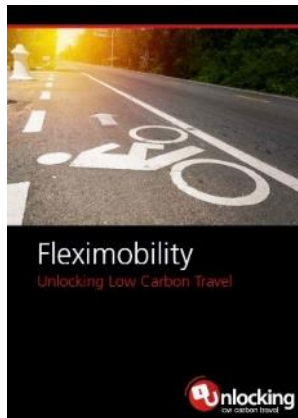
UWE BRISTOL
University of the West of England

University of Glasgow

Lancaster University

University of Brighton

The Open University

Fleximobility
Unlocking Low Carbon Travel

www.DisruptionProject.net
www.Fleximobility.Solutions

unlocking low carbon travel

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2012-15

2016-2020

Air Quality Management vs Air Pollution Control

Pollution Control = Use of predominantly technical measures (cleaner technology/end-of-pipe) to control *emissions* from individual sources (stacks or exhaust pipes)

Air Quality Management = The control of diffuse sources to achieve reductions in *ambient concentrations* of pollutants – tackling cumulative problems

*Emissions = Activity x **Emission Factor*** ➡️ *Emissions = **Activity** x Emission Factor*

A new approach to Air Quality Management WHO & WHY not just WHERE AND WHAT!

- Traditionally AQM has focussed very much on 'hotspots' where concentrations are highest
  = WHERE

- It also focusses on the objects that emit the pollution (e.g. cars, industrial plant, boilers etc.)
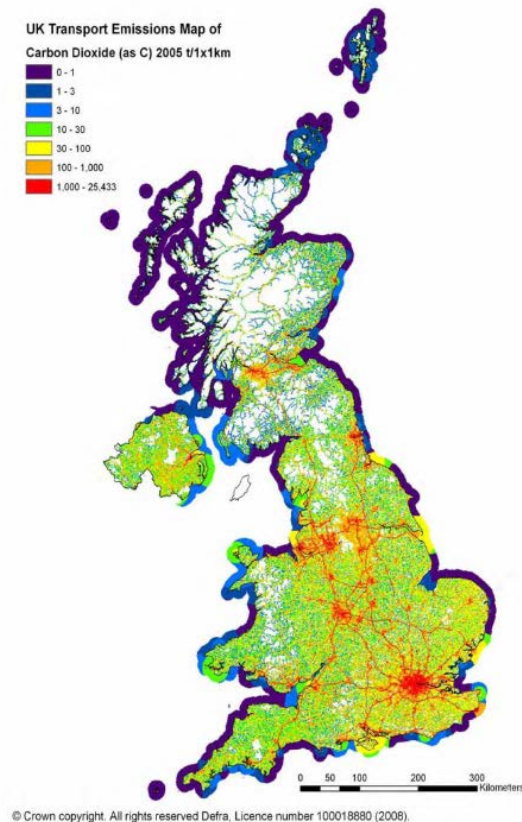 **= WHAT**

We propose:

- Looking not at cars but at drivers/owners **= WHO**

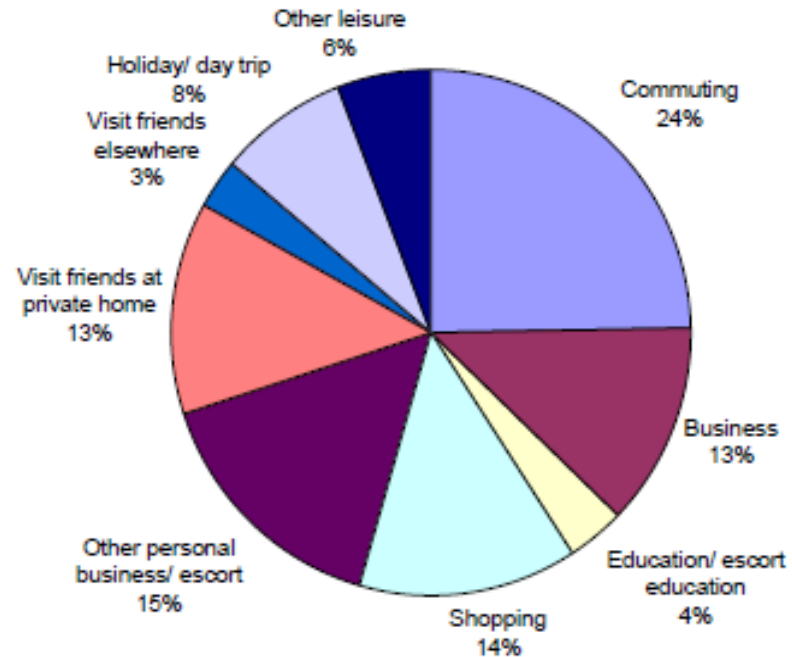- Apportioning emissions not by type of vehicle but by the type of journey being undertaken **= WHY**

Why is Pollution Created?

Moving from *point of use.....*

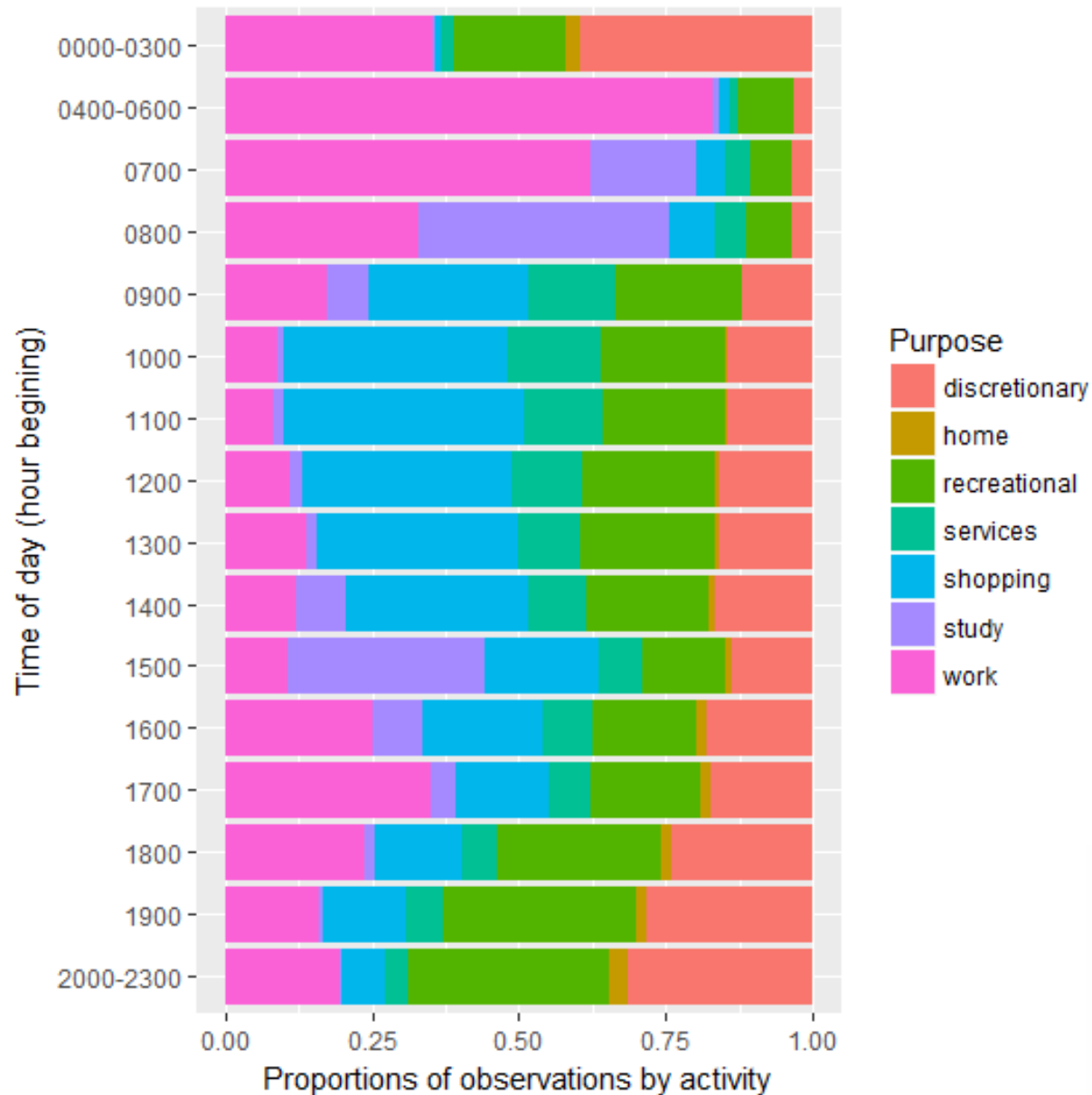Figure 1.4: Domestic transport CO₂ emissions as carbon, UK, 2005

UK Transport Emissions Map of Carbon Dioxide (as C) 2005 t/1x1km

- 0 - 1
- 1 - 3
- 3 - 10
- 10 - 30
- 30 - 100
- 100 - 1,000
- 1,000 - 25,433

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…to ***journey purpose***

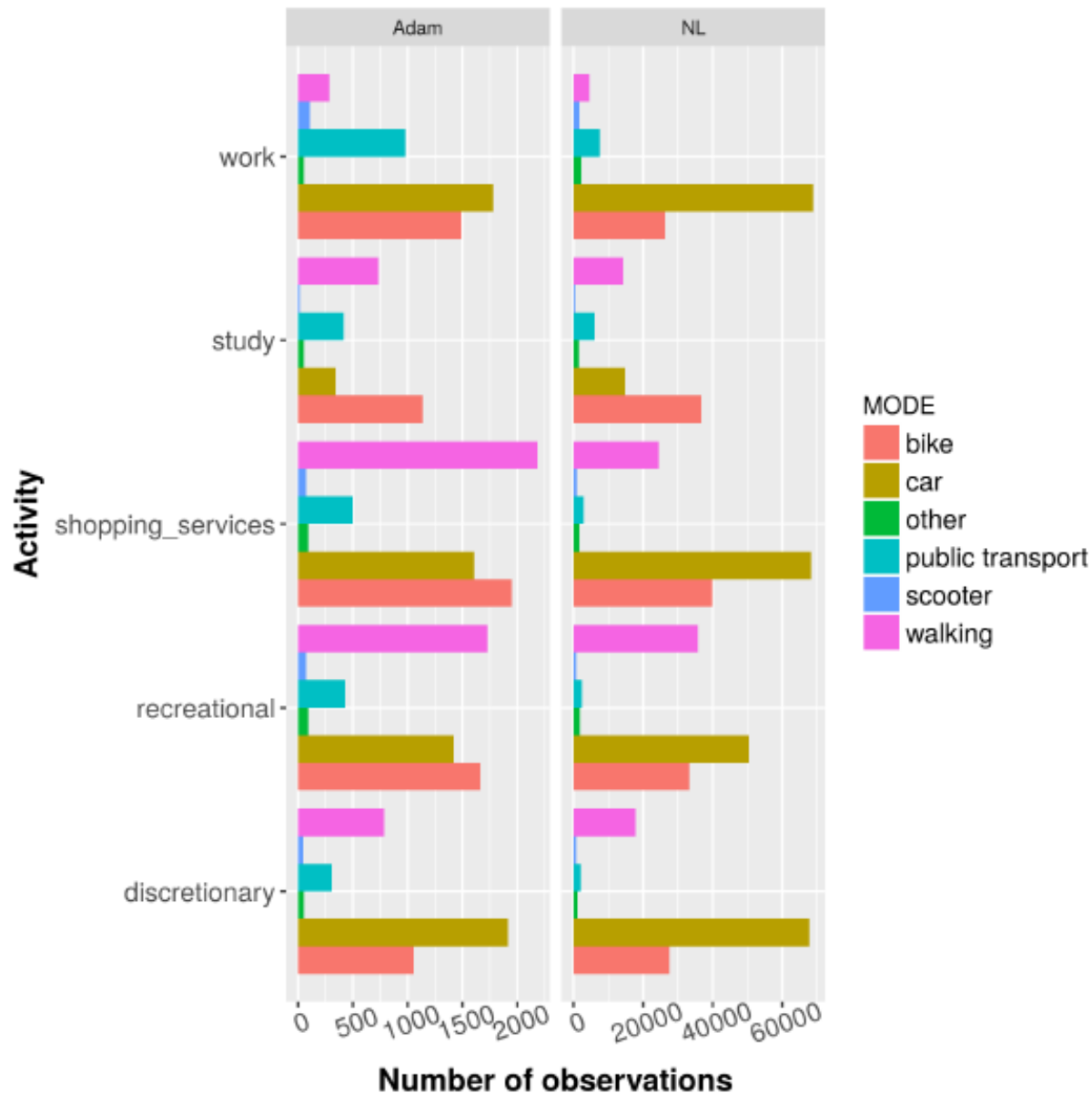Figure 3.3: Estimated CO₂ emissions from all modes of passenger transport by journey purpose, GB, 2002/2006 average
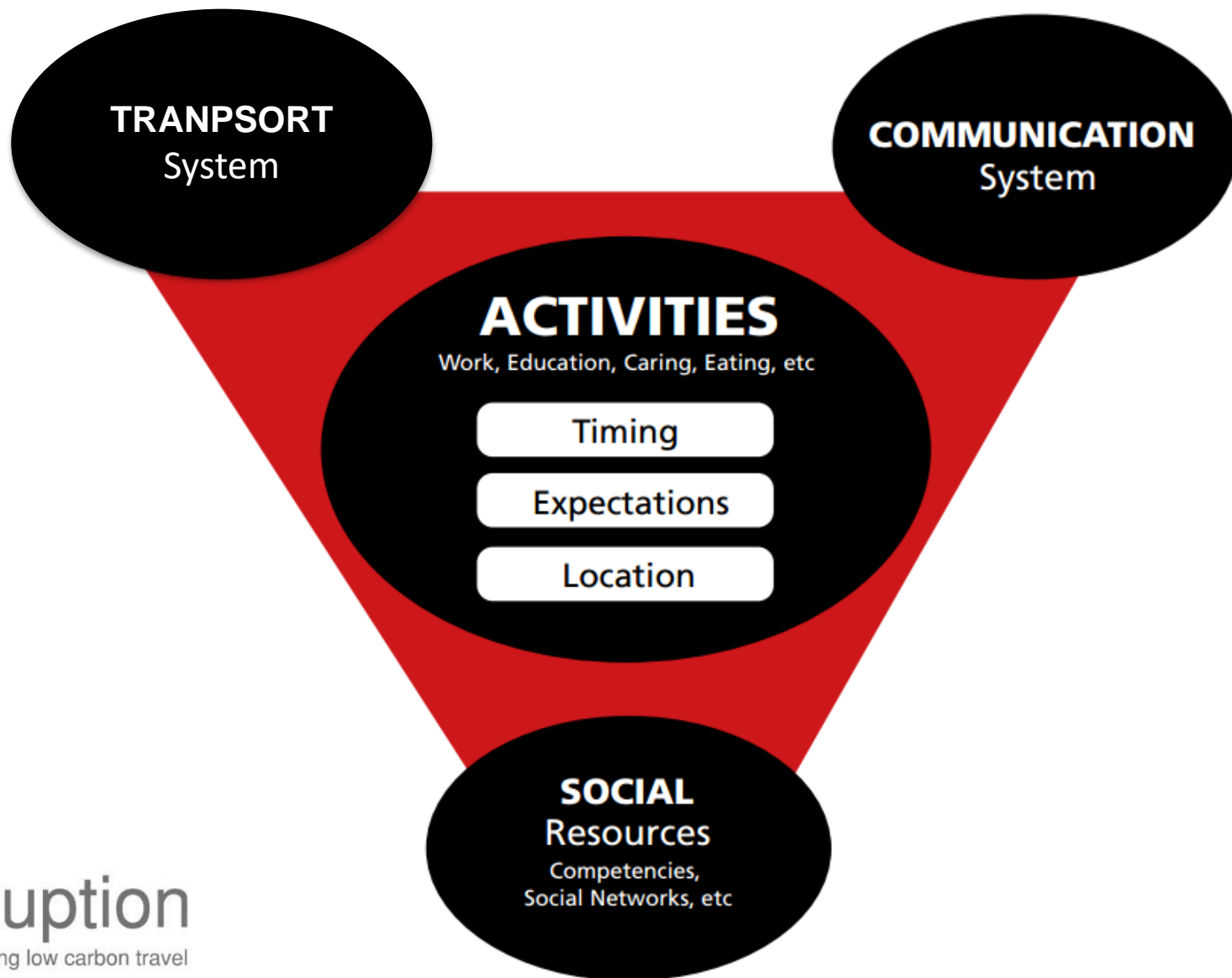
- Other leisure 6%
- Holiday/ day trip 8%
- Visit friends elsewhere 3%
- Commuting 24%
- Visit friends at private home 13%
- Business 13%
- Other personal business/ escort 15%
- Shopping 14%
- Education/ escort education 4%

Source: DfT analysis

ClairCity

Activity Changes Through Day

Mode Changes Due To Activity

The 'Mobility System'

TRANPSORT System

COMMUNICATION System

ACTIVITIES
Work, Education, Caring, Eating, etc

Timing

Expectations

Location

SOCIAL Resources
Competencies, Social Networks, etc

Disruption
unlocking low carbon travel
www.fleximobility.solutions

ClairCity: breaking the traditional dichotomy

Policy

Land-Use & Zoning

Material Infrastructure

Objects and Equipment

NGOs

Other Businesses

Service Providers

Families

Clubs, Societies

Employers

Friends

Households

Cultural Conventions

Expectations

Skills and 'Know-How'
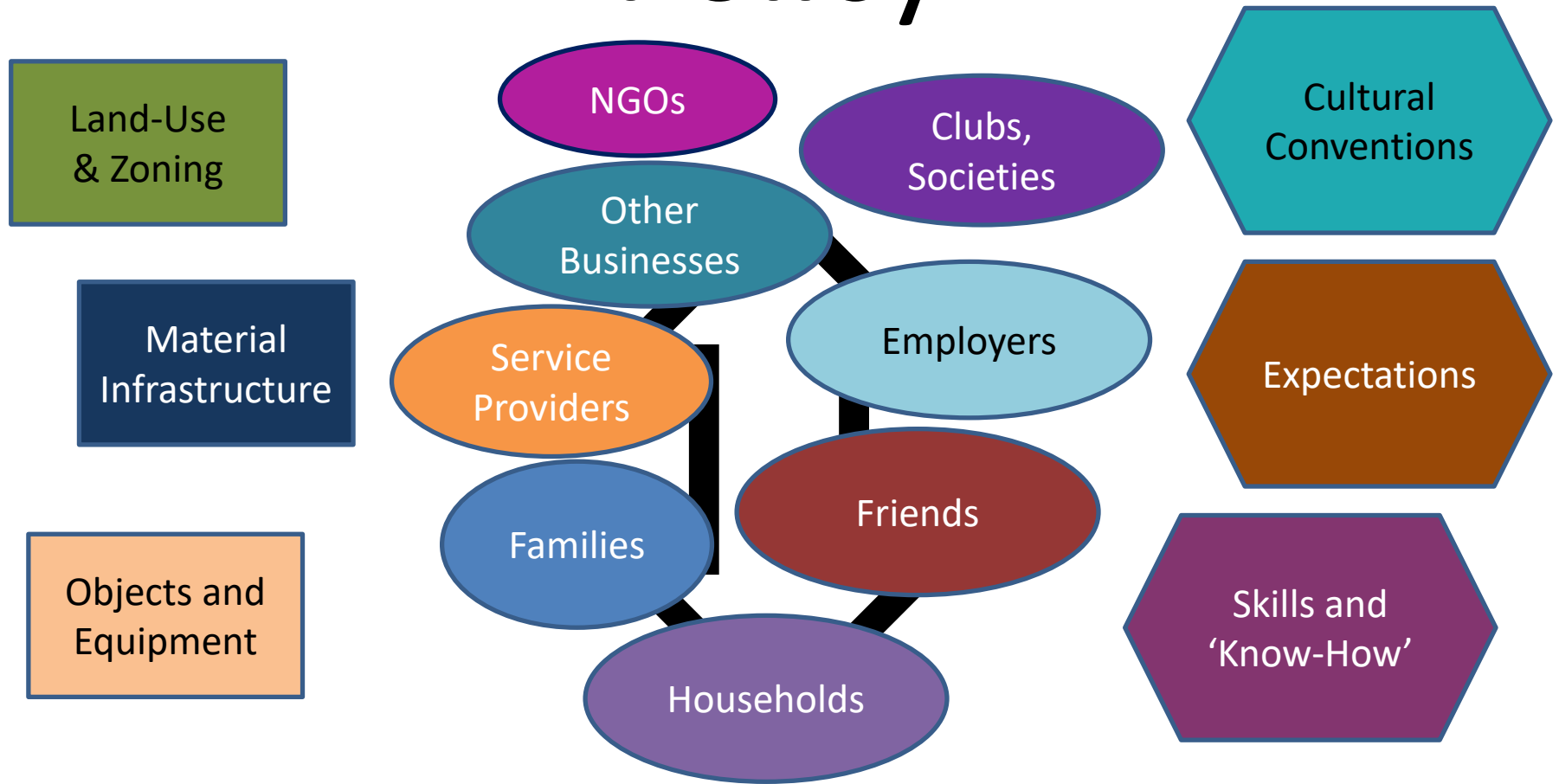
Individuals

Who is Creating Pollution?

- Looking at the "Polluter" not just the "Polluted"

- Who are the people driving the cars that cause the emissions?

- Do the people who cause the most pollution suffer from the most pollution?

- What types of areas lead to the most emissions?

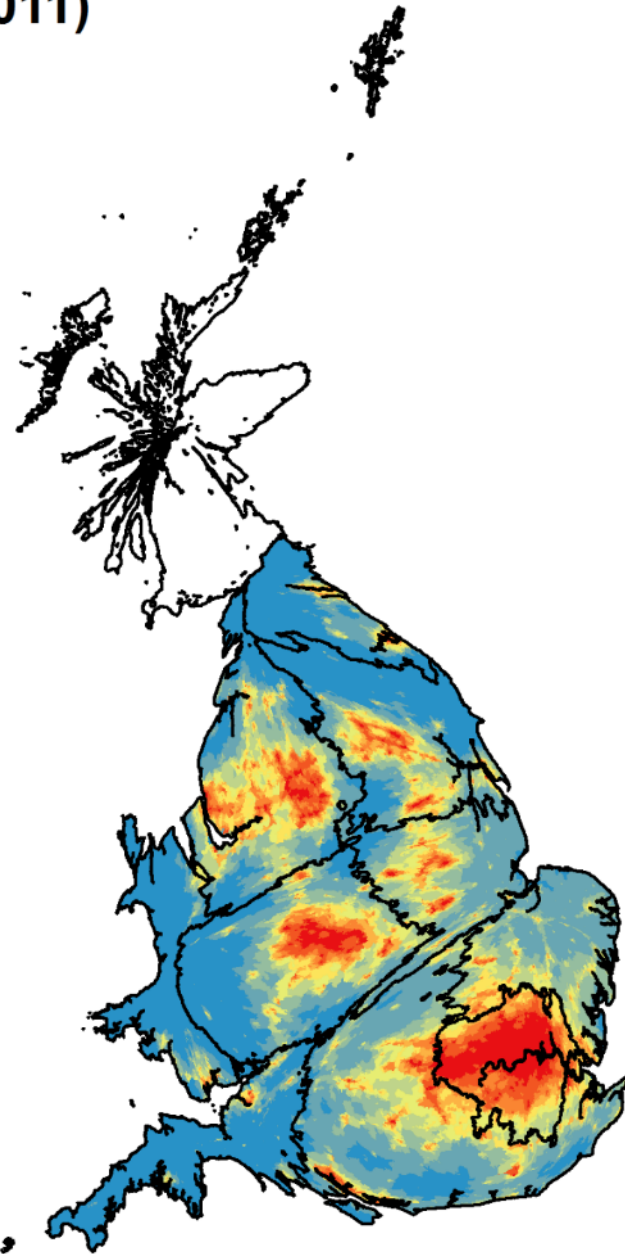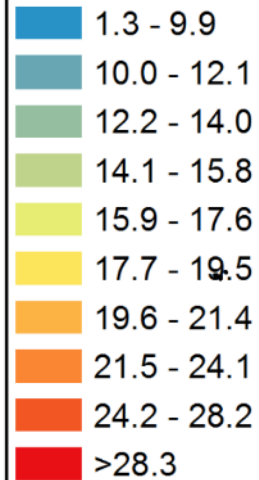- Are their social or structural reasons for this?

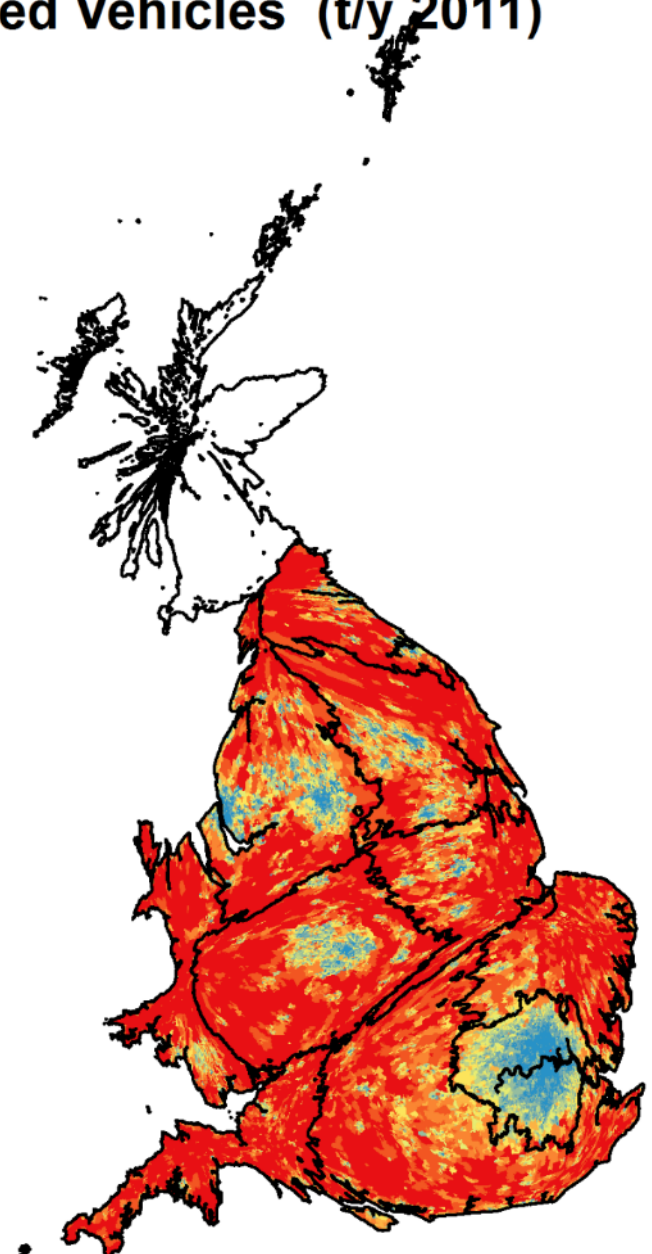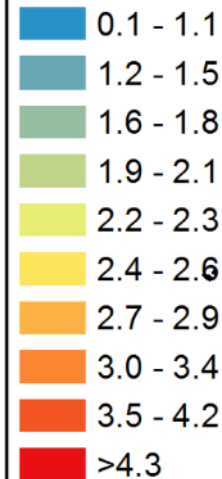**Total km Driven by Registered Vehicles (2011 - '000kms)**

- 472 - 4205
- 4206 - 5388
- 5389 - 6348
- 6349 - 7178
- 7179 - 7914
- 7915 - 8714
- 8715 - 9635
- 9636 - 10821
- 10822 - 12761
- >12762
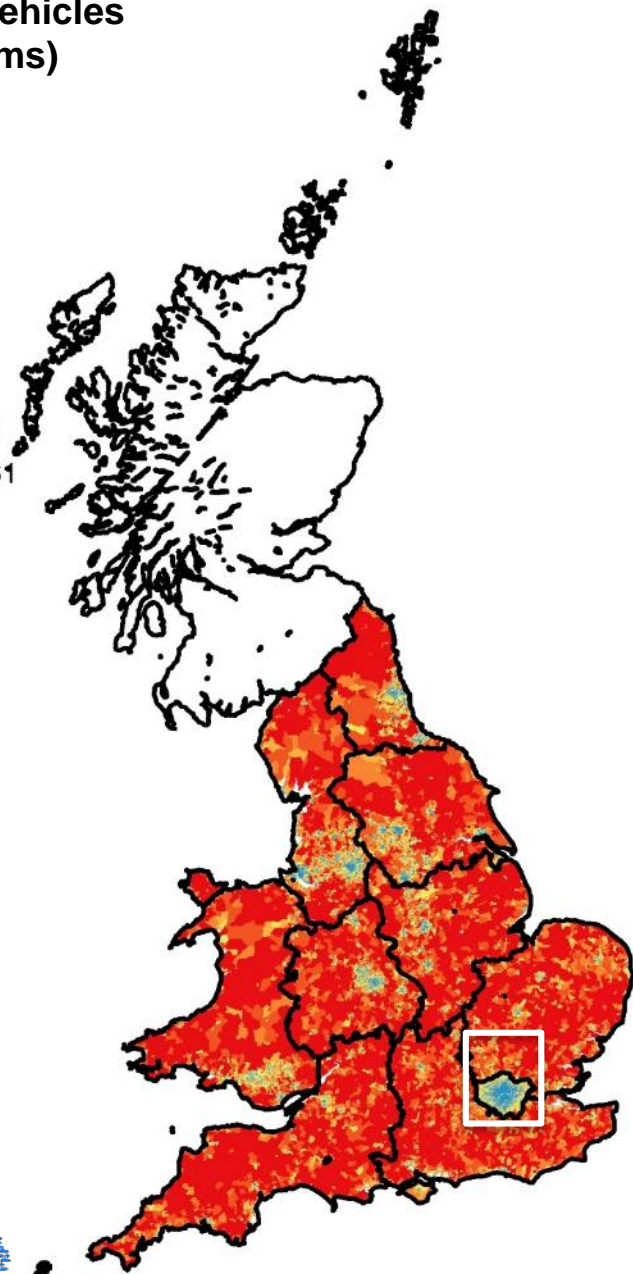
~35,000 areas
~700 households
~1600 people

~30,000,000 cars

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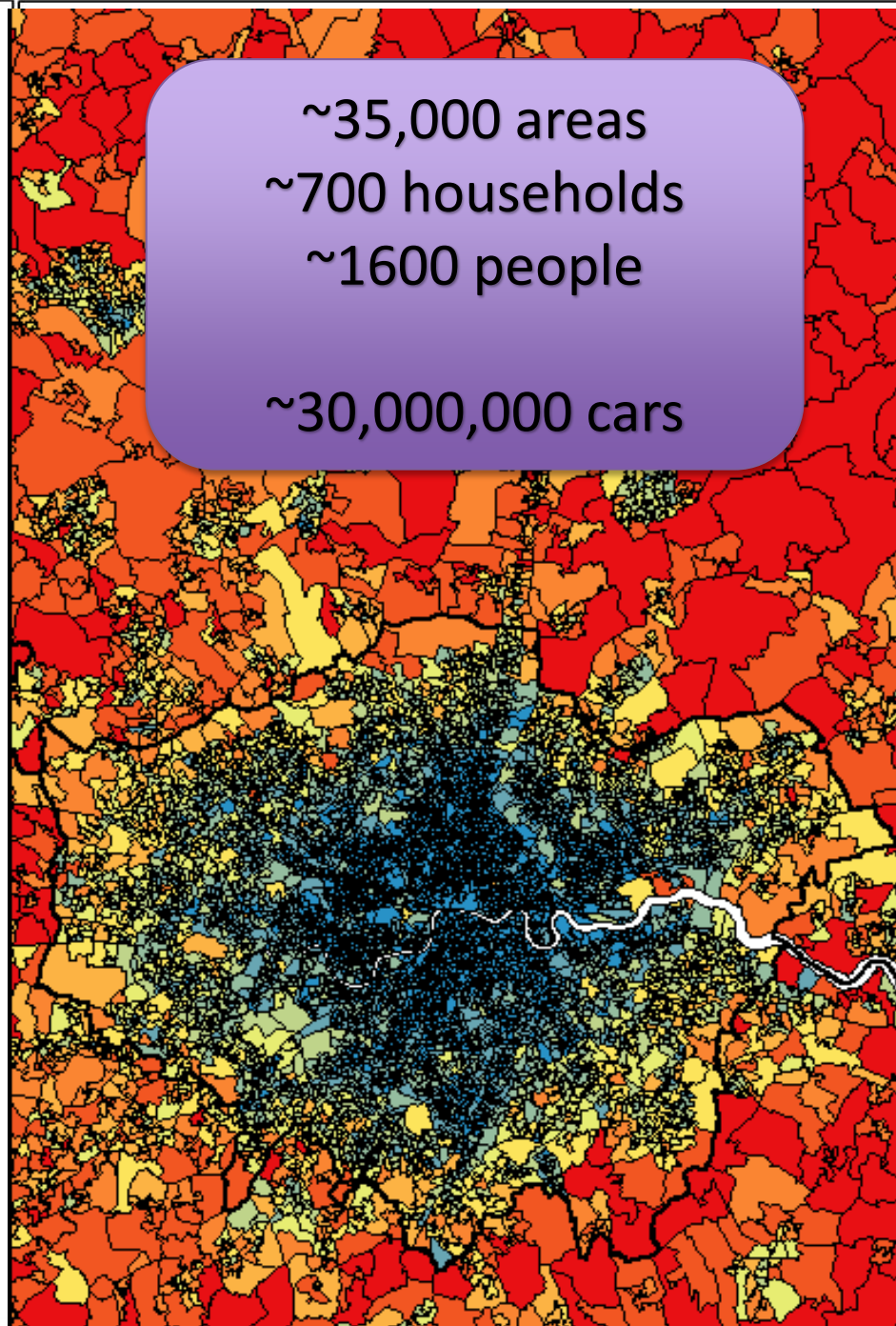
Concentrations of Nitrogen Dioxide (µg/m^{-3} 2011)

- 1.3 - 9.9
- 10.0 - 12.1
- 12.2 - 14.0
- 14.1 - 15.8
- 15.9 - 17.6
- 17.7 - 19.5
- 19.6 - 21.4
- 21.5 - 24.1
- 24.2 - 28.2
- >28.3

Emissions of Nitrogen Oxide from Registered Vehicles (t/y 2011)

- 0.1 - 1.1
- 1.2 - 1.5
- 1.6 - 1.8
- 1.9 - 2.1
- 2.2 - 2.3
- 2.4 - 2.6
- 2.7 - 2.9
- 3.0 - 3.4
- 3.5 - 4.2
- >4.3

MOT
Motoring and Vehicle Ownership Trends in the UK

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Exposure to NO$_2$ Concentrations
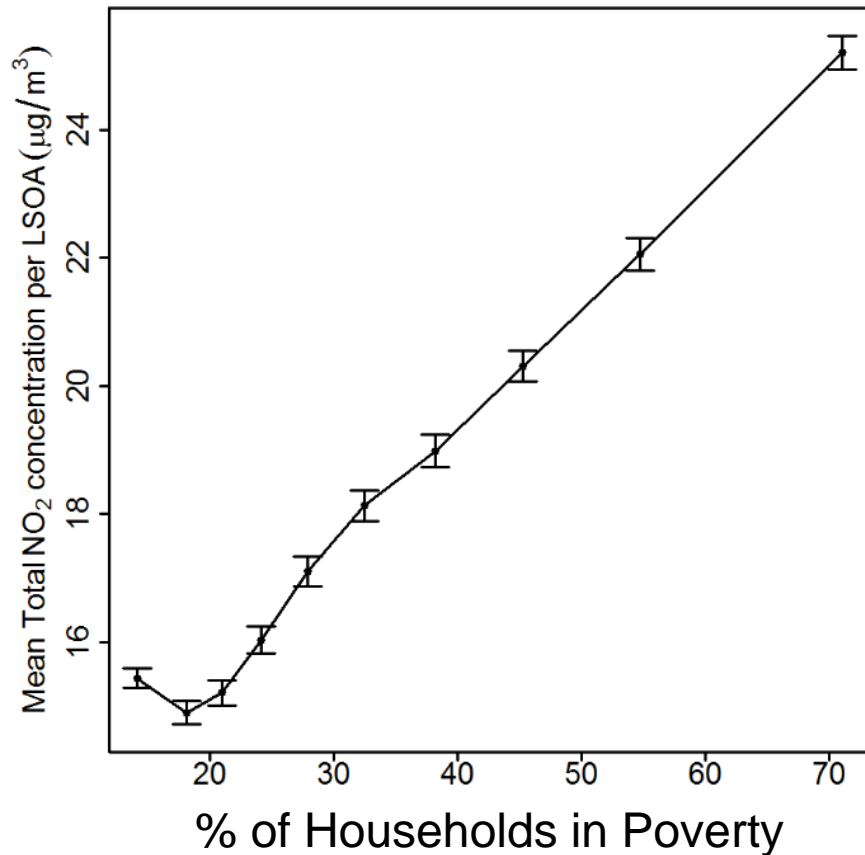
NOx Emissions from Local Vehicles

Barnes, J. and Chatterton, T. (2017) An environmental justice analysis of exposure to traffic-related pollutants in England and Wales. WIT Transactions on Ecology and the Environment, 210 (12). pp. 431-442. ISSN 1743-3541
http://dx.doi.org/10.2495/SDP160361
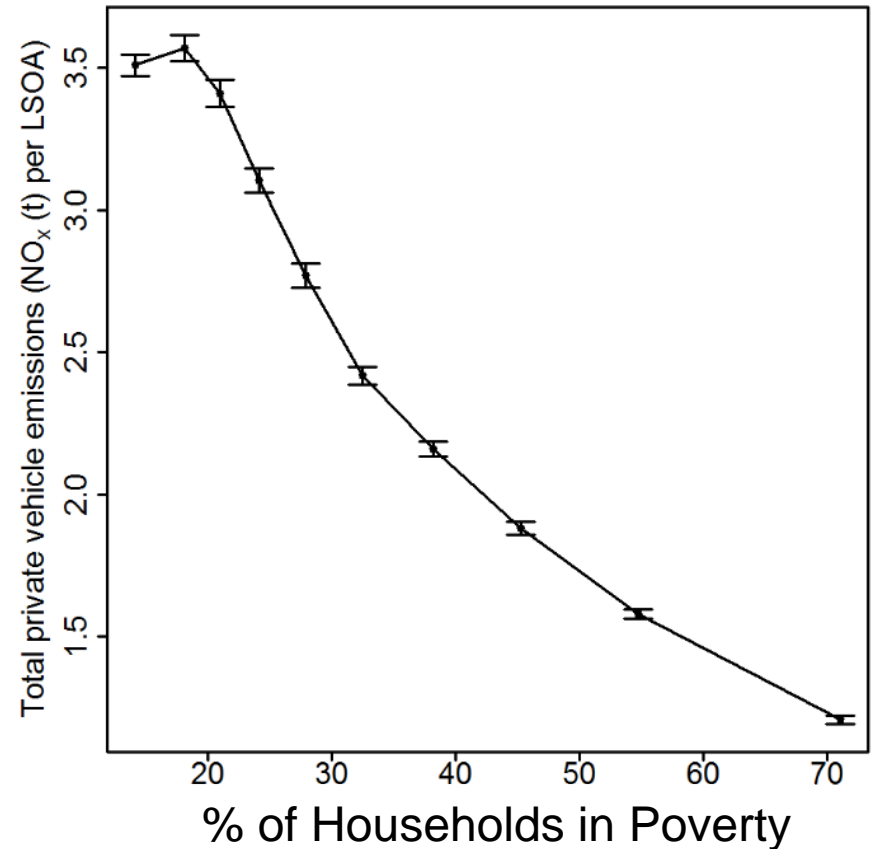
Office for National Statistics Output Area Classifications

OAC Supergroup

Rural Residents

Cosmopolitans

Ethnic Central

Multicultural Metropolitans

Urbanites

Suburbanites

Constrained City Dwellers

Hard Pressed Living

Dominant OAC Group per LSOA

- 1a Farming Communities
- 1b Rural Tenants
- 1c Ageing Rural Dwellers
- 2a Students Around Campus
- 2b Inner-City Students
- 2c Comfortable Cosmopolitans
- 2d Aspiring and Affluent
- 3a Ethnic Family Life
- 3b Endeavouring Ethnic Mix
- 3c Ethnic Dynamics
- 3d Aspirational Techies
- 4a Rented Family Living
- 4b Challenged Asian Terraces
- 4c Asian Traits
- 5a Urban Professionals and Families
- 5b Ageing Urban Living
- 6a Suburban Achievers
- 6b Semi-Detached Suburbia
- 7a Challenged Diversity
- 7b Constrained Flat Dwellers
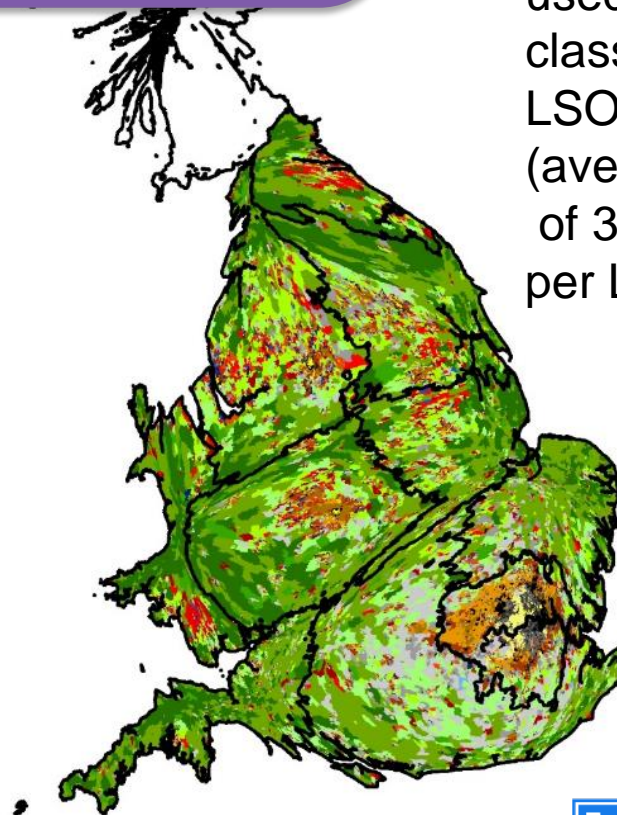- 7c White Communities
- 7d Ageing City Dwellers
- 8a Industrious Communities
- 8b Challenged Terraced Workers
- 8c Hard-Pressed Ageing Workers
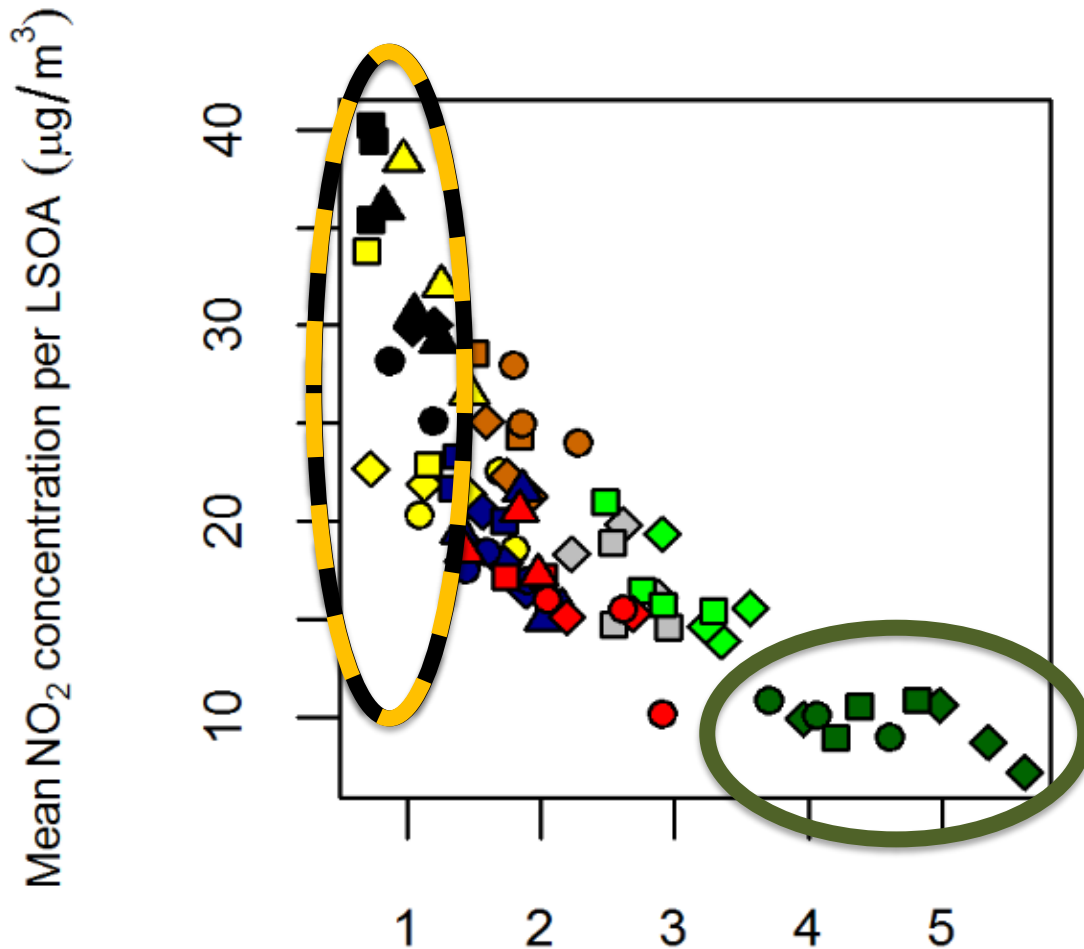- 8d Migration and Churn

60 Variables:
Age
Ethnicity
Housing type
Housing tenure
Household composition
Education
Employment
Health

8 Supergroups
27 Groups
76 Subgroups

Modal OAC used to classify LSOA (average of 3 OAs per LSOA)

MOT

Emissions vs Exposure

Access to Motor Vehicles
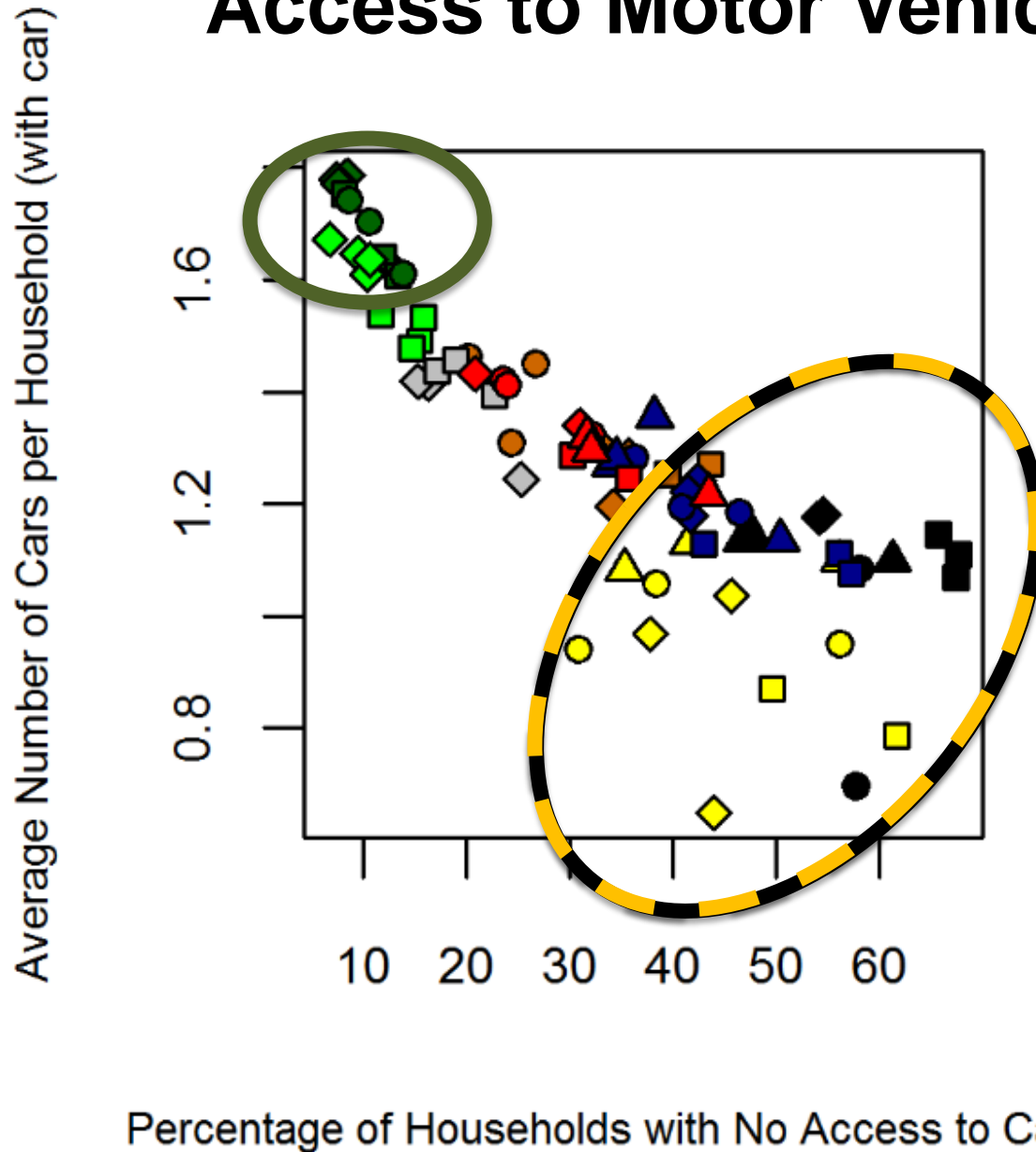
OAC Supergroup

Rural Residents

Cosmopolitans

Ethnic Central

Multicultural Metropolitans

Urbanites

Suburbanites

Constrained City Dwellers

Hard Pressed Living

Average Number of Cars per Household (with car)

Percentage of Households with No Access to Car/Van

Emission Factors vs Distance Driven
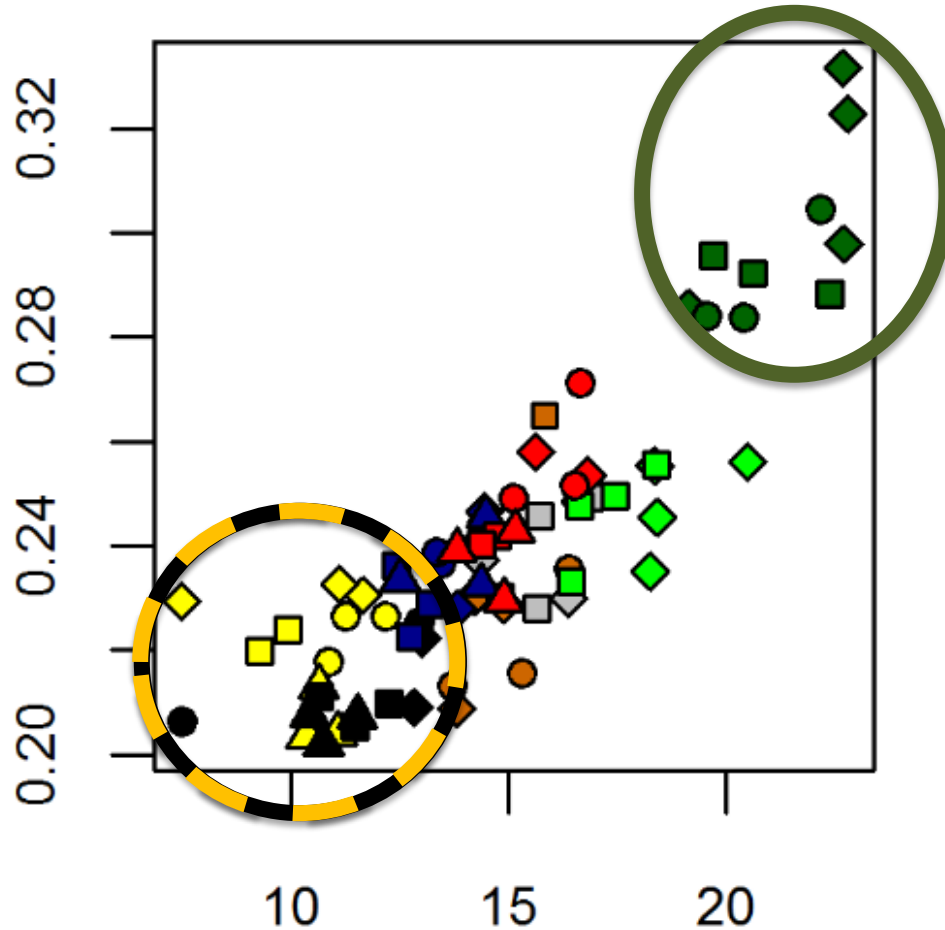
Chatterton, T. and Barnes, J. (2016) A social and spatial analysis of emissions from private vehicle use in Great Britain. WIT Transactions on Ecology and the Environment, 207. pp. 99-110. ISSN 1743-3541 http://dx.doi.org/10.2495/AIR160101

Summary

- AQM has failed to achieve both high levels of public engagement or to address activity part of the equation: *emissions = emission factors x activity*

- Social rather than technocentric and point-of-use approaches may help and should be *complementary* to current practice

- This will help to address the social and structural inequalities related to both the causes of air pollution and its impacts....

- And enable widespread emission reductions - not just hotspot management – linking to energy and carbon agendas and achieving a range of co-benefits

Thank You!

http://www.Fleximobility.Solutions
http://MOTproject.net
http://ClairCity.eu

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