Personal Air and Car Travel – just don't do it!

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Outline of the next 20 minutes

1. Motivation and aims

2. Methodology: travel emissions *profiling*

3. Case study: travel emissions *profiles*

4. Insights for policy

5. Conclusions and outlook

1. Motivation and aims

- GHG emissions from *personal* travel 18% of total UK *domestic* emissions, still rising
- Sharp increase in leisure air travel; *becoming a habit*
- Surprisingly little known *who* is contributing to the problem and what the emissions profile of the population is
- Lack of information at *household and individual levels* on *annual* travel activity, *international* travel, *all modes* of travel
- This lack of information makes policy formulation difficult
- Tough choices to be made: *who affected?*

- à **Travel emissions profiles**
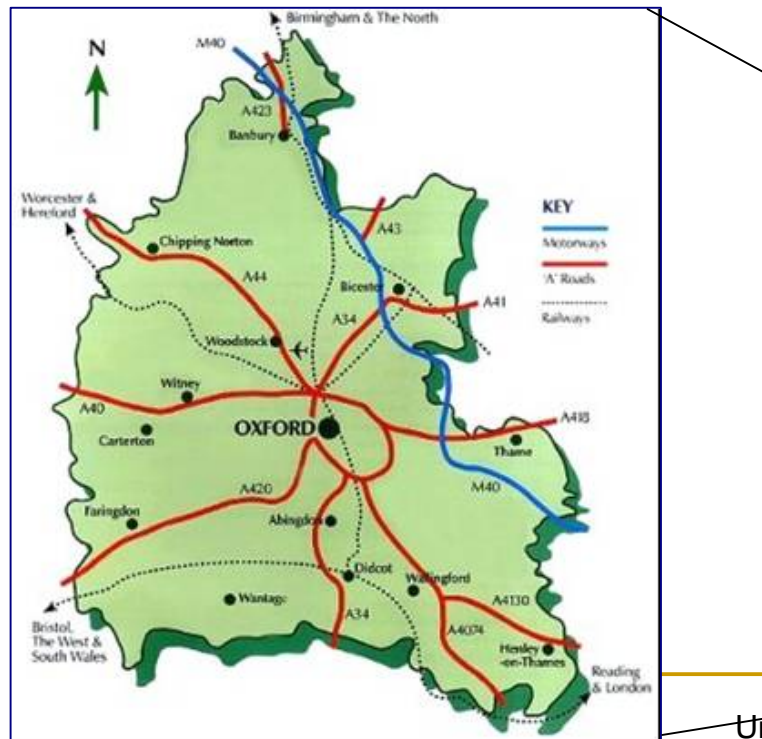
2. Methodology: emissions profiling (1)
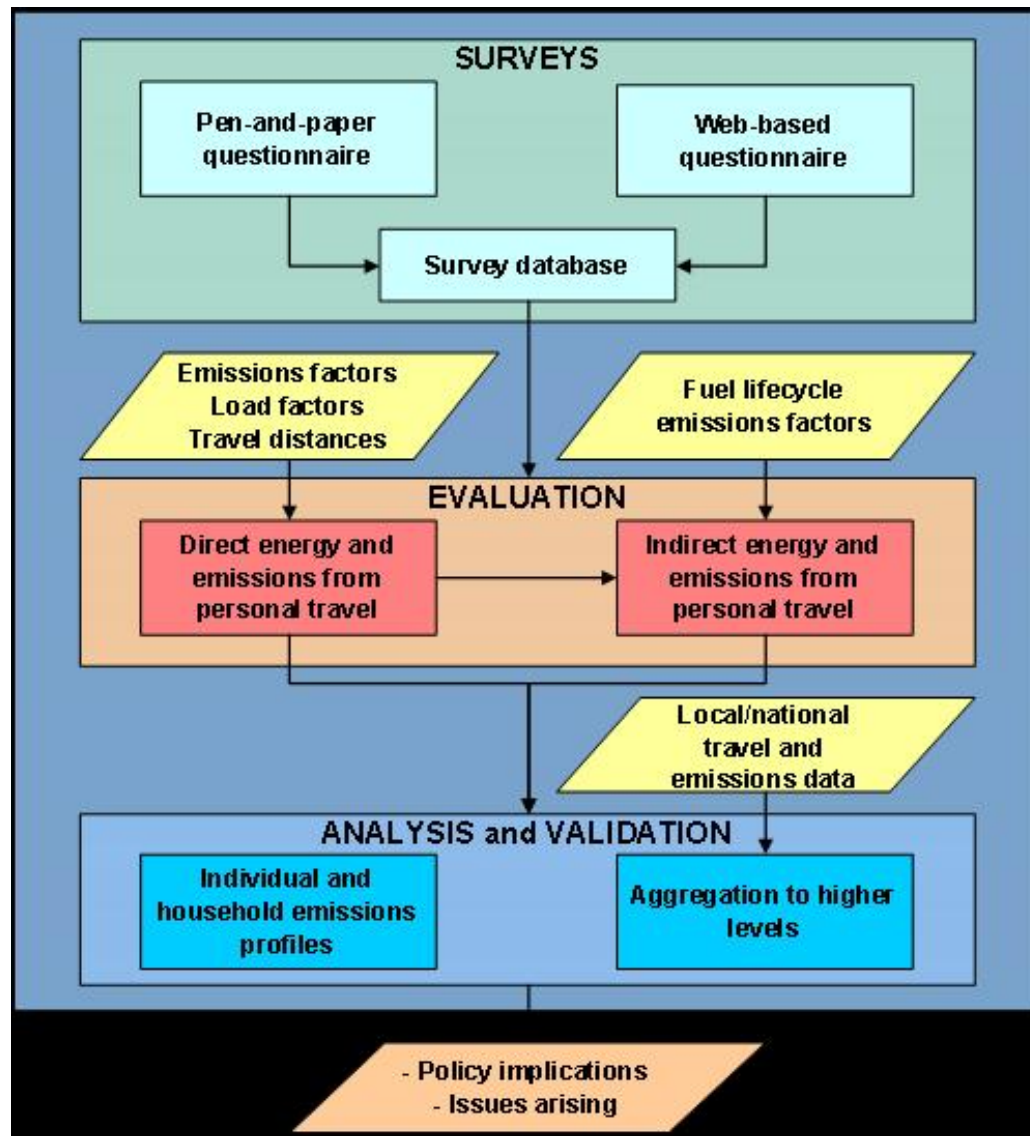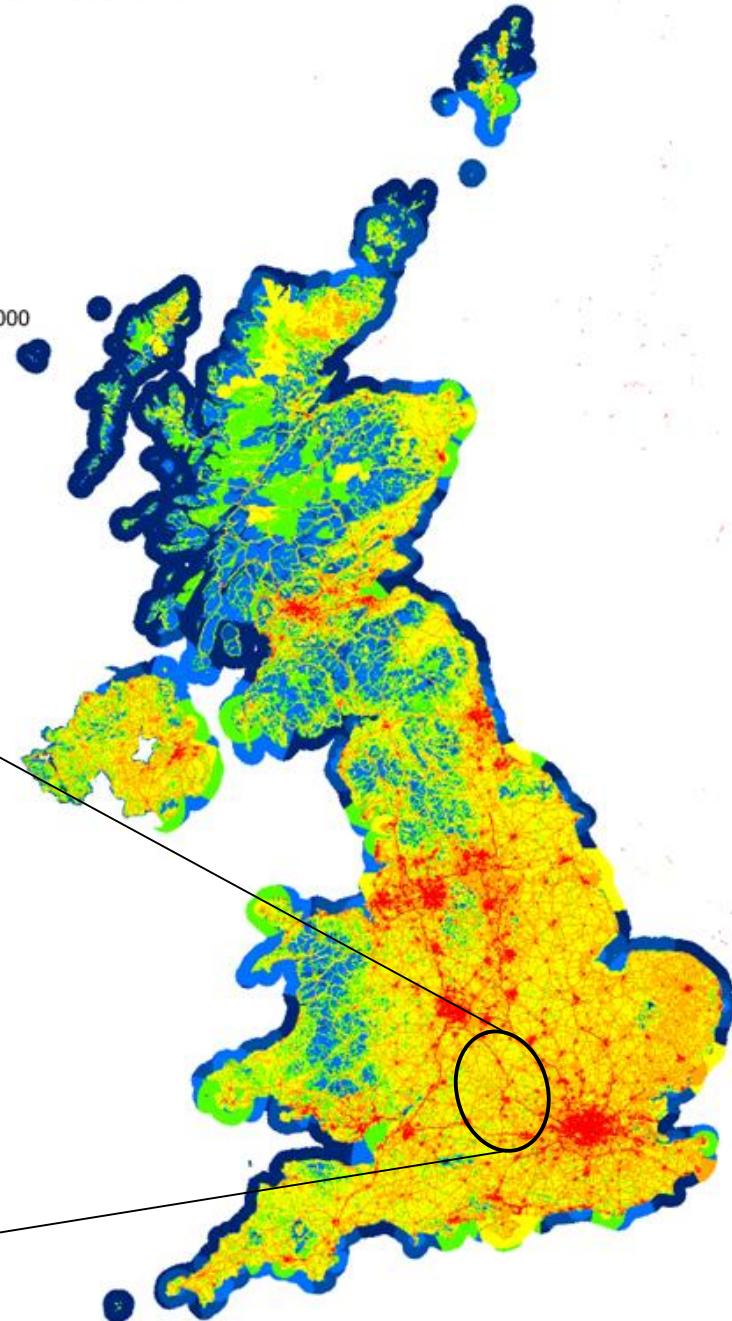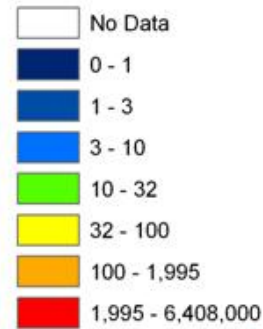

- n Methodology to measure, evaluate and analyse CO_2^{eq}
- n 12-month period
- n Households, individuals (including children >6yrs)
- n Personal travel (not business)
- n Multiple techniques
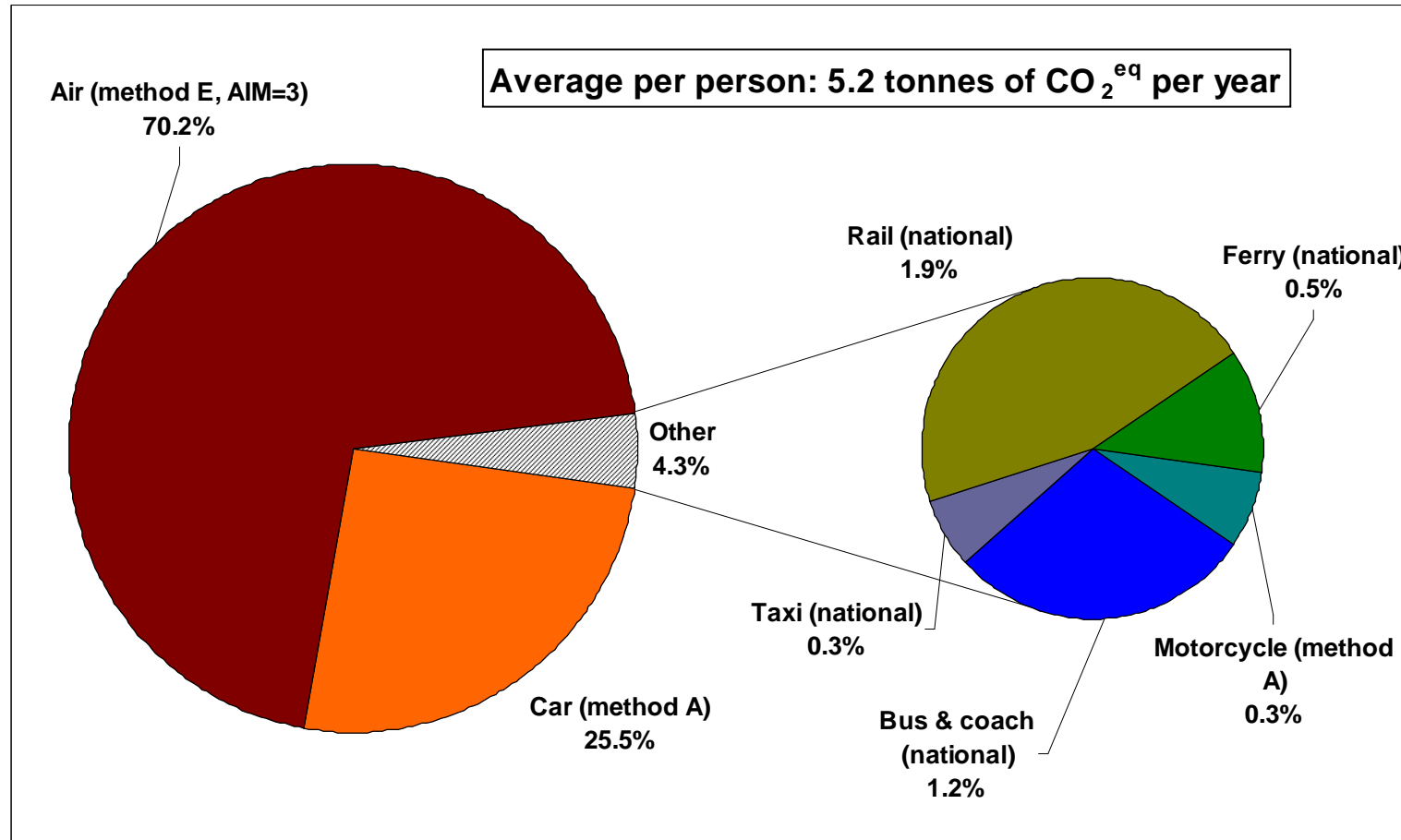- n Policy implications

2. Case study

- County of Oxfordshire
- Household survey
- Sample size of 456 individuals (20% response)
- Good representation of pop
- Urban vs. rural (4 types)

UK Emissions Map of
Carbon Dioxide (as C) 2003 t/1x1km

	No Data
	0 - 1
	1 - 3
	3 - 10
	10 - 32
	32 - 100
	100 - 1,995
	1,995 - 6,408,000

3. Results: travel emissions profiles (1)

Average per person: 5.2 tonnes of CO_2^{eq} per year

Air (method E, AIM=3)
70.2%

Car (method A)
25.5%

Other
4.3%

Rail (national)
1.9%

Ferry (national)
0.5%

Taxi (national)
0.3%

Motorcycle (method A)
0.3%

Bus & coach (national)
1.2%

Base: all 456 individual responses

3. Results: travel emissions profiles (2)

§ Highly unequal distribution of emissions
§ Large disparities between individuals and households
§ A few high emitters responsible for the lion's share

Household CO$_2$^{eq} emissions from air travel by geographical area
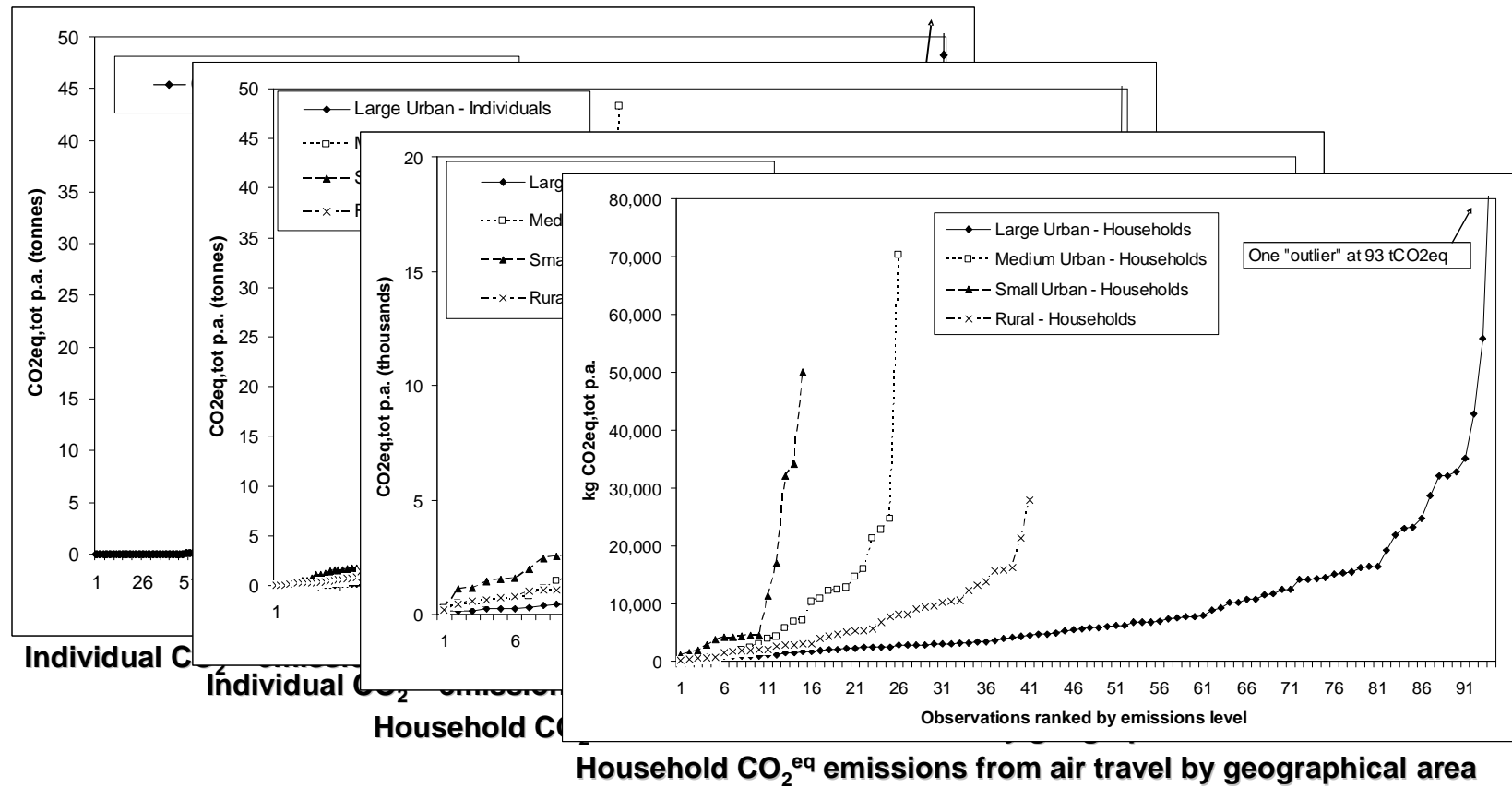
3. Results: travel emissions profiles (3)

§ Top 20% responsible for 61% of emissions (average 16 tonnes CO_2^{eq})

§ 'High-over-Low factor' of 90 (all modes of travel)
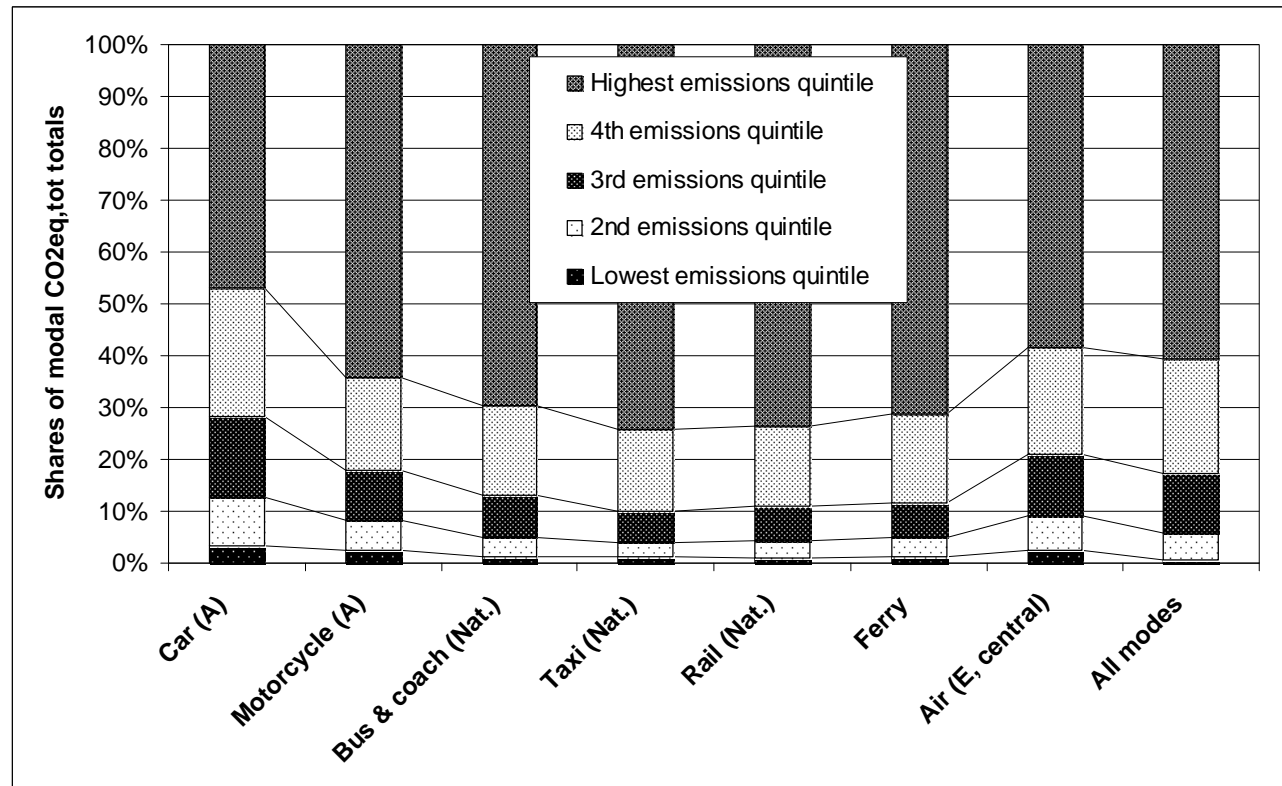
Bases: 266 (car), 12 (motorcycle), 313 (bus & coach), 210 (taxi), 239 (rail), 68 (ferry), 269 (air)

3. Results: travel emissions profiles (4)

- $CO_2{}^{eq}$ emissions are mainly influenced by income, age, working status, car availability, household composition and size

- Overall weak or non-existent correlation with household location, accessibility and gender

- Top 10% typically in their 30s and 40s, in full- or part-time work and earning £30,000 p.a. or more

- Bottom 10% typically women, children or residents older than 75 years, not economically active, non-car drivers and on low income of less than £10,000 p.a.

- Some variation cannot be explained by this analysis – lifestyles, attitudes better to explain behaviour?

4. Policy implications (1)

ENDS report, Feb '07

ENDS

ENDS Report 385, February 2007, pp 15-16
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Aviation dominates transport impacts

A study of people's travel patterns has found that aviation accounts for as much as 70% of the sector's contribution to climate change with high earners responsible for most transport emissions.[1]

The study, by an Oxford University team, monitored the travel patterns of nearly 500 people in Oxfordshire over a year. They excluded business travel.

They found aviation was the biggest single source responsible for 47.7% of emissions, followed closely by other forms of transport including rail, bus, and ferries.

These figures do not take account of the additional Intergovernmental Panel on Climate Change that water vapour high in the atmosphere results in radiative forcing aviation's carbon dioxide emissions alone.

When the Oxford team applied a radiative forcing share of climate impacts increased to 70.4% and all other sources combined were responsible for

The average climate impact from the sample found that a few high emitters were responsible

The top 20% of emitters were responsible for 16tCO₂e. The bottom 20% were responsible for 0.2tCO₂e. Most of the rest of the sample emitted modes of transport with a small number of

The study found that people on higher incomes from high income groups were 11.2tCO₂e emitters were responsible for 19.2tCO₂e

Conversely, lower income groups like pe

The figures, particularly for car and air few travellers could be responsible for for government attempts to rein in tran

The study suggests that incremental r the worst polluters will be able to absc

"The doubling of the air passenger du the researchers behind the report. "T prices are closer to where they were

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Taxes 'fail to curb travel CO2'

Current UK green tax plans are unlikely to curb the growth in greenhouse gas emissions from travel, a study says.

High-income

Air Passenger Duty is unlikely ...eter high earners, scientists say ...e people's behaviour.

...the day that the Air ...led; part of the ...Chancellor Gordon Brown

...d the effectiveness of ...lusive evidence from this ...en income and

...sed fiscal instruments ...l-price increases are ...e wealthy sub-sector

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High-earning men blamed over climate changing emissions

James Randerson, science corresponder...
Saturday March 10, 2007

The Guardian, March 2007

Guardian

Working men earning more than £40,000 a year are responsible for the lion's share of climate change emissions from personal travel, according to a Oxford University survey. It found that one in five people are responsible for 61% of climate change emissions from private transport and that most of these are well-off men.

Christian Brand at the university's transport studies unit, who carried out the research with Brenda Boardman, said that discussions about reducing emissions usually focused on the average carbon footprint. "Our work shows there's a huge range," he said.

While most people emitted between one and three tonnes of CO2 in total through their personal travel in the previous year, the top 10% had an average of 19.2 tonnes of CO2 from flying alone. The data came from a survey of leisure travel using all modes of transport by 456 people at 278 addresses in Oxfordshire.

The survey points to aviation as the biggest single source of emissions, closely followed by car use. The impact from air travel on global warming is higher than its carbon emissions alone because gases and water vapour are released at altitude. Taking this effect into account, the team calculated that aviation's share of climate impact is 70.4%. "Air travel is so cheap - mainly because there is hardly any tax paid on it - that people start thinking of that as their first mode of transport when it comes to leisure travel," said Dr Brand.

Tony Juniper, of Friends of the Earth, said: "Finding ways in which the message can be got through to the people with the biggest carbon footprint would be a way of getting some easy wins. That needs to be reflected in policy, for example changing the way in which vehicle excise duty is levied to discourage people from buying big gas guzzlers and putting more of a signal into the price of a flight ticket."

The danger was that even if large numbers of people changed their behaviour a small minority could blow targets out of the water. Peter Cox, a climate expert at Exeter University, believes the rich would be able to buy themselves higher emissions. "Putting a tax on a unit of carbon wouldn't hit them particularly hard."

Guardian Unlimited © Guardian News and Media Limited 2007

4. Policy implications (2)

- Focus on personal air (and car) travel
- Policy should target high emitters – *but how effectively?*
- Moderate tax rises unlikely to curb growth in carbon emissions
- Cap-and-trading of personal carbon (travel + household energy) may be better to change behaviour.
- Would challenge the highest emitters: top 10% of population may use up any in a couple of months
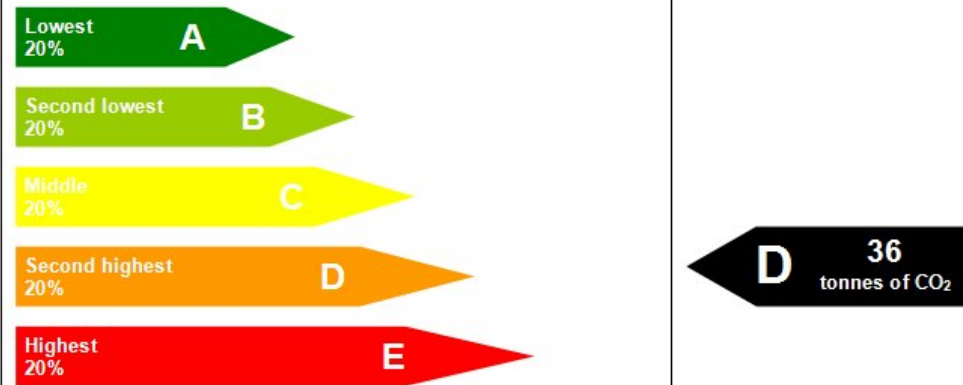
5. Conclusions and outlook

- Personal Air and Car Travel – some of us 'do it every day'
- Unequal distribution amongst the population – 20/60 rule?
- Socio-economic and other factors can explain some of the variation in emissions, but not all

- Travel emissions profiling as a tool for:
    - Carbon measurement and monitoring
    - Awareness raising and feedback

Household Greenhouse Gas Emissions

100 Some Road, Sometown, AB0 0CD

How does your household compare to national figures?
(households ranked by emissions totals and grouped into bands of 20% of all households)

- Lowest 20% **A**
- Second lowest 20% **B**
- Middle 20% **C**
- Second highest 20% **D**
- Highest 20% **E**

D 36 tonnes of CO_2

Your travel and associated emissions

- At nearly 120,000 kilometres, your household travels 86% more than the average 5-person household
- The one return flight to Los Angeles dominates total km travelled by all members of your household
- Car travel comes second overall, however with 25% less than the 5-person household average.
- The distances travelled by rail are 60% more than the 5-person household average.
- You walk and cycle considerably more than the national average, with major health benefits
- Your household greenhouse gas emissions are 61% higher than the 5-person household average
- You fall into the second highest emissions quintile of all UK households
- The all-family long-haul flight to Los Angeles is the main culprit
- At the individual level, Stephen is the highest emitter, mainly because of the highest car travel emissions (nearly 50% higher than national average per person)
- Emissions from public transport play no major role

Personal travel activity (in miles per year)

Travel emissions (in kilogram of carbon dioxide)
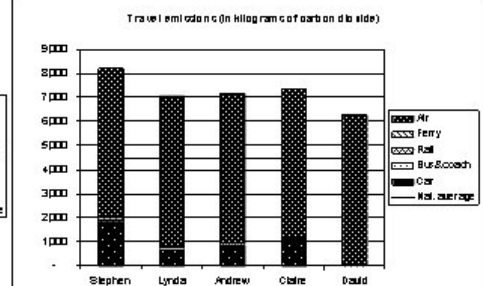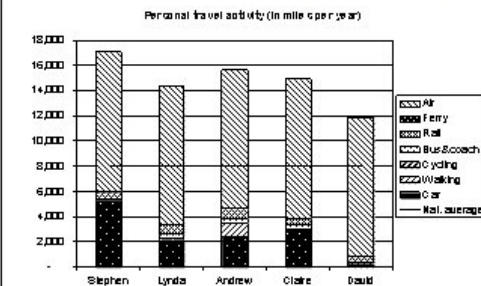
'Good'

- Walking, cycling and public transport
- Good car fuel efficiency

'Could do better'

- Reduce number of long-haul flights
- Replace short car trips with walking/cycling

Expert advice

- Think of spending next year's holiday in the UK or Europe (preferably by rail)
- Walk and cycle even more for short journeys, thus reducing car use.
- Next time you buy a car, get an even more efficient one, e.g. a hybrid electric. Your two diesel cars boast better than average fuel economy and carbon dioxide emissions performance. One of the cars is getting a bit old. Thus there is an opportunity to either get rid of it without replacement or buy a fuel efficient, low carbon car instead. www.vcacarfueldata.org.uk can give advice on what car is best.

Further information

- Reports on the study at www.tsu.ox.ac.uk/research/oxontravel

- Web-based survey still viewable

  (guest login: "oxontravel", password: "onthemove")

- Contact details

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2. Methodology: emissions profiling (2)

Primary data collection in surveys – lots and lots and lots...

Household and individuals

- HH size and structure, incomes, occupation, age, gender, vehicle ownership
- Accessibility to key services and public transport

Cycling, walking, bus, taxi, rail, ferry

- Day-to-day travel (e.g. commuting) – peak/off-peak
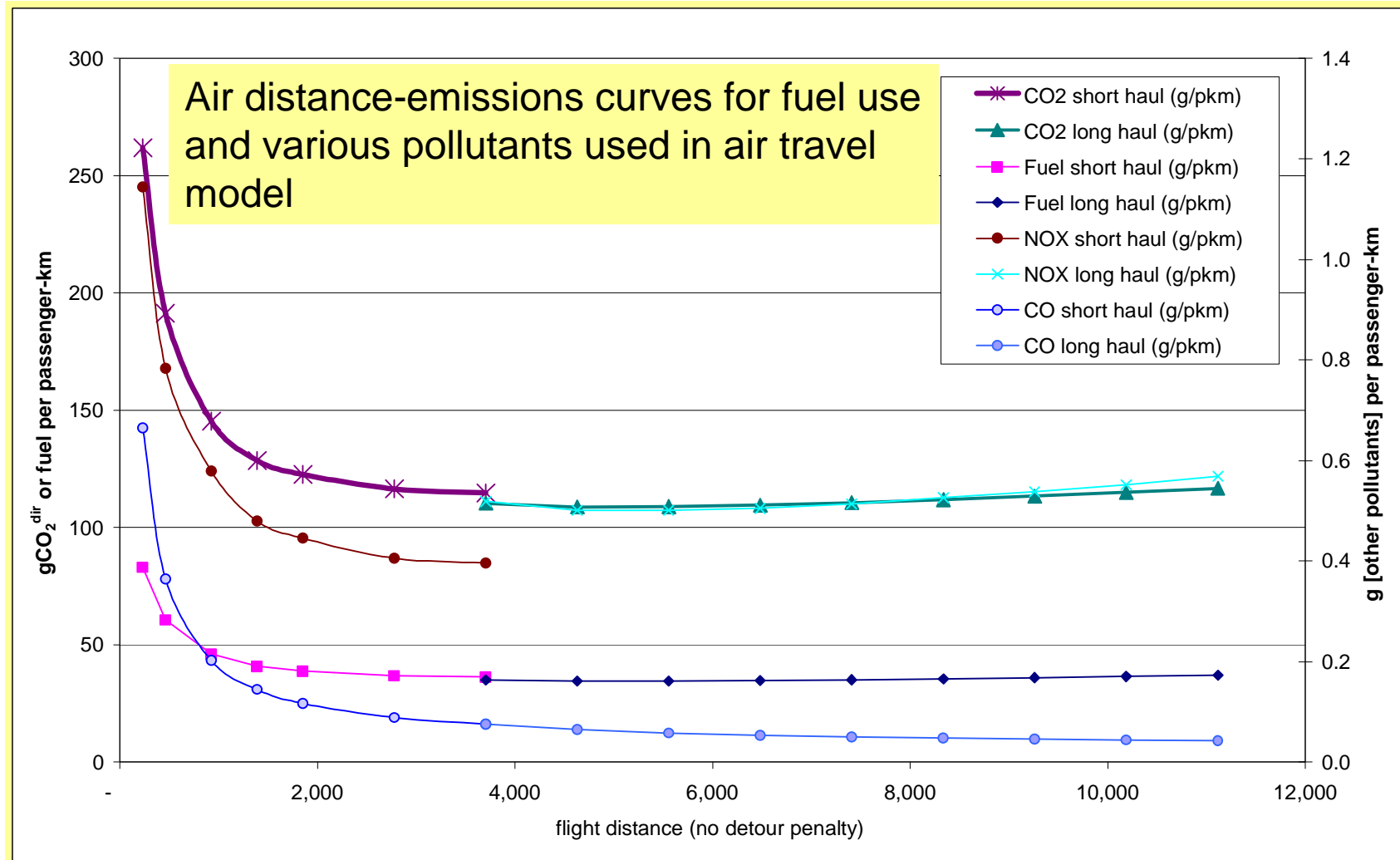- Casual travel (e.g. holidays, visiting friends)

Air travel

- Origin, destination, stopovers
- Duration estimate
- Occupancy estimate

Private vehicle information

- Make, model, age, fuel type, engine size
- Annual vehicle mileage
- Road type, trip distances
- Shared use within HH
- Fuel purchases and use

Air distance-emissions curves for fuel use and various pollutants used in air travel model

Legend:
- CO2 short haul (g/pkm)
- CO2 long haul (g/pkm)
- Fuel short haul (g/pkm)
- Fuel long haul (g/pkm)
- NOX short haul (g/pkm)
- NOX long haul (g/pkm)
- CO short haul (g/pkm)
- CO long haul (g/pkm)

x-axis: flight distance (no detour penalty)

left y-axis: gCO_2^{dir} or fuel per passenger-km

right y-axis: g [other pollutants] per passenger-km

3. Results: travel emissions profiles

n   Air and car travel dominate overall carbon emissions

n   Emissions from public transport very small

n   Highly unequal distribution of emissions

n   'Hockey-stick' shape of emissions ranking curves remarkably similar for different units of analysis, geographical location, modes of travel, …

n   Large disparities between individuals and households: some 20% of the respondents drove but did not fly although the same number flew but did not drive

n   Top 10% of emitters responsible for 43% of emissions and the bottom 10% for only 1%

n   Higher emissions of urban population (due to higher propensity to travel by air?)

3. Results: travel emissions profiles (5)

§ Example: highly significant disproportionality between CO_2^{eq} emissions from air travel and income