



Appendix 10

Knowledge Review of the Social and Distributional Impacts of DfT Climate Change Policy Options



Final Report to Department for Transport

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Appendix 10: Summaries of the literature reviewed in detail

Social and Distributional Impacts of Transport Climate Change Policies

Author(s)	Heffner R.R., Kurani K.S. Turrentine T.S	Year of publication	2007
Title/publication	Symbolism in California's Early Market for Hybrid Electric Vehicles		
Context			
	<i>Type of study e.g. literature review, survey</i>		
	<i>Geographic – country, region, city</i>		
	<i>Sample size (if relevant)</i>		

1. What climate change policies are we concerned with?

The paper discusses attitudes towards hybrid electric vehicles.

2. What are the potential key social impacts of different climate change policy options?
 - a) For each key potential social impact (bearing in mind Atkins' definition), we need to identify the policies that potentially have the (positive or negative) impact. Where impact is dependent on other factors (e.g. scope or stringency of policy, way in which investment is undertaken), these need to be identified clearly.
 - b) Can any disproportionately negative affects be mitigated or positive ones be further maximized? If so, how?

Not covered by this report

3. How will these impacts (positive or negative) differ between different social groups (distributional impacts)?
 - c) Are there any disadvantaged groups or areas that may be particularly negatively or positively affected? If so, how?
 - d) Can any disproportionately negative affects be mitigated or positive ones be further maximized? If so, how?
 - e) To what extent is the impact dependent on the area in which the different social group live?

Not covered by this report

4. What key groups and /or geographical areas will be most affected (positively or negatively) by these different social impacts?
 - a) What is the likely impact of the policy measures that we have considered on people's travel behaviours?
 - b) Who and where will be most affected by these and how?

Not covered by this report

5. How are public attitudes (including acceptability) likely to differ between social groups for both mandatory and voluntary options? How will take-up (and the barriers to take-up) of voluntary measures differ between groups?

The collective benefits of HEVs are clear, less polluting cars reduce the risk of climate change. The private benefits of HEVs, however, are ambiguous; reduced expenditures on fuel are routinely shown to be less than the vehicle purchase price premium of the hybrid vehicle over an assumed non-hybrid alternative.

The research has shown 5 main reasons to buy a HEV. Some households mentioned more than one reason but none mentioned all 5.

1) Preserve the environment

Many households acknowledged purchasing their HEVs as a response to environmental concerns. However, most had only a basic understanding of environmental issues or the ecological benefits of HEVs. Rather than buying their HEVs with measurable environmental goals in mind, most of the individuals in this study bought a symbol of preserving the environment that they could incorporate into a narrative of who they are, or who they wish to be (Heffner page 14). The connotations related to this reason included ethics (doing the right thing), concern for others, community orientation, and intelligence/awareness.

2) Oppose war

The research discovered that HEVs symbolize opposition to a particular type of war (war over resources) that violates the personal ethics of HEV owners.

3) Cost savings

It appears households act on symbols of savings rather than financial calculations. None of the households who emphasized the cost savings conducted a comparative cost analysis before purchasing their HEV. Many HEV owners are interested in finances, but rather than performing financial calculations, they appropriate and incorporate a symbol of sound financial decision making into stories about themselves. (Heffner page 15).

4) Reduce support for oil producers

HEVs also symbolize reducing support for oil producers: multinational energy companies and the governments of oil-producing nations. The solution for these HEV owners is to use less petroleum so as to minimize the financial payments they make to these companies and countries.

5) Embrace new technology

Finally, many owners were motivated by their perception that HEVs are new, advanced technology vehicles. However, few owners had more than a basic understanding of how the technology actually worked. They were more likely to talk about visible features: the engine shut-off, low-speed all-electric mode, or real-time fuel economy displays. The connotation of individuality is linked to the embracing new technology denotation. Because HEVs are a new type of vehicle, they distinguish their owners as “a little different” from their peers (Heffner page 16). Owners also see buying a HEV as sending a message to vehicle manufacturers about consumer demand for HEVs.

This is only useful if we can attribute the above reasoning to specific social and income groups.

6. What will impact (in qualitative terms in absence of quantitative data) of policy options be on the
i) transport behaviours, and ii) CO2 emissions, of different groups?

Not covered by this report

7. What remaining gaps exist in the evidence base and how could these be filled?

The paper explains that, as HEVs become more mainstream, their symbolic meaning changes so continued research is important.

Social and Distributional Impacts of Transport Climate Change Policies

Author(s)	O' Garra T. , Mourato S. Pearson P.	Year of publication	2004
Title/publication	Analysing awareness and Acceptability of Hydrogen Vehicles: A London Case Study		
Context			
	<i>Type of study e.g. literature review, survey</i>		
	<i>Geographic – country, region, city</i>		
	<i>Sample size (if relevant)</i>		

1. What climate change policies are we concerned with?

The promotion of alternative fuel vehicles

2. What are the potential key social impacts of different climate change policy options?

- a) For each key potential social impact (bearing in mind Atkins' definition), we need to identify the policies that potentially have the (positive or negative) impact. Where impact is dependent on other factors (e.g. scope or stringency of policy, way in which investment is undertaken), these need to be identified clearly.
- b) Can any disproportionately negative affects be mitigated or positive ones be further maximized? If so, how?

The study does not look at social and distributional impacts of the policy. Instead it aims to measure acceptability of Hydrogen as a fuel.

3. How will these impacts (positive or negative) differ between different social groups (distributional impacts)?

- a) Are there any disadvantaged groups or areas that may be particularly negatively or positively affected? If so, how?
- b) Can any disproportionately negative affects be mitigated or positive ones be further maximized? If so, how?
- c) To what extent is the impact dependent on the area in which the different social group live?

Not covered by this study.

4. What key groups and /or geographical areas will be most affected (positively or negatively) by these different social impacts?

- a) What is the likely impact of the policy measures that we have considered on people's travel behaviours?
- b) Who and where will be most affected by these and how?

5. How are public attitudes (including acceptability) likely to differ between social groups for both mandatory and voluntary options? How will take-up (and the barriers to take-up) of voluntary measures differ between groups?

Various studies showed that respondents with in-depth knowledge about hydrogen fuel were more positive about H2 vehicles than respondents with little knowledge (O'Garra, page 2). Direct experience of hydrogen transport also influences acceptability.

Existing transport economics research indicates that environmental concerns are not key determinants in the choice of transport technologies, which in general is typically determined by price and performance. Of those economic studies that do report a correlation between environmental attitude and acceptance for cleaner transport, environmental concern is found to be a weaker influence than price and performance (O'Garra, page 3).

Public concerns with H2 safety are not as significant as many experts in the field of H2 transport have believed. Only 20% of all free-associations people made when confronted with the word 'hydrogen' were negative and related to safety concerns or explosiveness. While some 22% of associations were clearly positive (and related to cleaner fuels), for most people hydrogen tended to be considered in neutral terms (O'Garra, page 9).

Notably, prior knowledge of H2, although not widespread, emerged as the main determinant of support for the introduction of H2 vehicles with socio-economic variables having no significant influence on H2 support.

Existing knowledge about both H2 and fuel cell vehicles appeared to be consistently determined by gender. This strong relationship suggests that there is a greater interest or involvement of men in the fields of new transport technologies and/or fuels (O'Garra, page 10).

Gender, age and university education all have a positive influence on knowledge. Hydrogen awareness is related to gender, age, education and environmental knowledge: information therefore needs to be presented differentially (in type and source) in order to best reach the community it intends to inform.

6. What will impact (in qualitative terms in absence of quantitative data) of policy options be on the i) transport behaviours, and ii) CO2 emissions, of different groups?

Not covered by this report.

7. What remaining gaps exist in the evidence base and how could these be filled?

Further research should investigate the extent and quality of existing public knowledge about H2 transport and related technology and its relationship with the source, type and quantity of information available.

Further work is also warranted on how to optimise the presentation of information to the majority of respondents (60% in our study) who are likely to need more information before constructing an opinion on H2 and FC transport.

Social and Distributional Impacts of Transport Climate Change Policies

Author(s)	Job van Exel, Sytze Rienstra, Michael Gommers, Alan Pearman and Dimitrios Tsamboulas	Year of publication	2002
	John Segal, MVA Consultancy		2009
Title/publication	EU involvement in TEN development: network effects and European value added The full costs of intercity transportation & A Strategy for a High Speed Rail Network in Britain , John Segal, MVA Consultancy		
Context			
	<i>Type of study e.g. literature review, survey</i>		
	<i>Geographic – country, region, city</i>		
	<i>Sample size (if relevant)</i>		

The Trans-European Networks (TEN) in the field of transport are a key element in the process of further economic integration and the promotion of free traffic of goods, persons, services and capital as well as economic and social cohesion in the Single European Market. Some well-known examples of TEN's are cross-border High Speed Rail links, and improving international waterway links such as the Danube. Promotion of the TEN and 'fair and efficient pricing', based on marginal cost pricing principles, are the two central issues in the Common Transport Policy of the European Union, both under the overall goal of achieving a sustainable transport system

1. What climate change policies are we concerned with?

High Speed rail

- ### 2. What key groups will be impacted (positively or negatively) by different climate change policy options?
- What is the likely impact of the policy measures that we have considered on people's travel behaviours?
 - Who and where will be most affected by these and how?

Those who can afford it can travel further in a shorter time period. Long distance commuting possible now.

3. What are the potential key social impacts of different climate change policy options?

- For each key potential social impact (bearing in mind Atkins' definition), we need to identify the policies that potentially have the (positive or negative) impact. Where impact is dependent on other factors (e.g. scope or stringency of policy, way in which investment is undertaken), these need to be identified clearly.
- Can any disproportionately negative affects be mitigated or positive ones be further maximized? If so, how?

Travel cost and time benefits. The impact can involve changes in user costs, consumer surplus loss, travel time changes, congestion impacts on travel time.

Safety. This includes a reduction inhuman costs but also reduced costs like police and fire services and legal costs. However, the effects of faster driving due to less cars on the road have not been discussed.

Local environment. The impacts will concern the following: improvements in local air pollution but increased noise and severance on users on non-users and effects on landscape. There might also be local environmental impacts due to changes in economic activities.

Strategic environment. Greenhouse gas reductions, less use of fossil fuels.

Strategic economic development. Changes in economic activities might occur in certain regions which might have a re-distributive effect. Also changes in land use might have a positive or a negative effect on certain social groups.

Strategic mobility. Increased or reduced accessibility.

4. How will these impacts (positive or negative) differ between social groups (distributional impacts)?
 - a) Are there any disadvantaged groups or areas that may be negatively or positively affected? If so, how?
 - b) Can any disproportionately negative affects be mitigated or positive ones be further maximized? If so, how?
 - c) To what extent is the impact dependent on the area in which the different social group live?

This will depend on the pricing of the high speed rail. It is likely to be more useful for males rather than females as they often have childcare responsibilities and therefore have jobs closer to home. (own opinion)

5. How are public attitudes (including acceptability) likely to differ between social groups for both mandatory and voluntary options? How will take-up (and the barriers to take-up) of voluntary measures differ between groups?
6. What will impact (in qualitative terms in absence of quantitative data) of policy options be on the i) transport behaviours, and ii) CO2 emissions, of different groups?

CO2 reductions are not quantified in this paper. However, another paper (A Strategy for a High Speed Rail Network in Britain, John Segal, MVA Consultancy) estimates 7% of trips to come from car and 17% from airplane while the majority (57%) will come from classic rail.

2.7bn car-km would be removed from the highway network pa, along with 0.4bn HGV-km. 18bn air passenger km would also be removed pa (assuming that there was capacity for such air flows in the absence of high speed rail). Overall, approximately 1 million tonnes of CO2 would be saved per annum (Segal, page 13).

7. What remaining gaps exist in the evidence base and how could these be filled?

More research on who uses high speed rail and what is a price that is affordable to all social economic classes.

Social and Distributional Impacts of Transport Climate Change Policies

Author(s)	Heiskanen E	Year of publication	
Title/publication	Low-carbon communities as a context for individual behavioural change		
Context			
	<i>Type of study e.g. literature review, survey</i>		
	<i>Geographic – country, region, city</i>		
	<i>Sample size (if relevant)</i>		

1. What climate change policies are we concerned with?

This paper considers the role that communities could play in helping bring about behavioural change. It does not examine transport policies as such, but the approaches used could bring benefit to the transport sector in the future. It highlights that traditional energy conservation (and climate change mitigation) programmes have suffered from an individualistic focus and identifies (in line with other literature) that more focus should be placed on the community level and that energy users should be engaged in the role of citizens, and not only that of consumers.

2. What are the potential key social impacts of different climate change policy options?

- a) For each key potential social impact (bearing in mind Atkins' definition), we need to identify the policies that potentially have the (positive or negative) impact. Where impact is dependent on other factors (e.g. scope or stringency of policy, way in which investment is undertaken), these need to be identified clearly.
- b) Can any disproportionately negative affects be mitigated or positive ones be further maximized? If so, how?

The paper does not address social impacts in the way identified above, but instead examines the role in which social groups as communities can help address climate change. It suggests how communities can help 1) address social dilemmas around whether other people 'are doing their bit' 2) change existing social and consumption conventions 3) contribute to new infrastructure 4) support individual empowerment, through helping provide a feeling of competence, feedback on impacts of their measures and a 'voice' in devising solutions.

3. How will these impacts (positive or negative) differ between different social groups (distributional impacts)?

- a) Are there any disadvantaged groups or areas that may be particularly negatively or positively affected? If so, how?
- b) Can any disproportionately negative affects be mitigated or positive ones be further maximized? If so, how?
- c) To what extent is the impact dependent on the area in which the different social group live?

The paper does not consider impacts (positive or negative) between different social groups. It provides case study examples of different types of low carbon communities. These are:

Urban community: Manchester is My Planet – which encourages citizens across Greater Manchester to reduce their CO₂ emissions by 20% by 2010. The aim was to address three key motives to mobilise participation. 1) Alignment with a mainstream 'cool and fun' campaign 2) Saving money, the financial benefits of action were clearly demonstrated. 3) Empowerment to

reduce the impacts of climate change. Here, how personal action can reduce CO₂ emissions was demonstrated.

Sector Community: Green office, which is a certification and training programme which employs community building among the participating organisations. Networking and commitments are integral elements to the scheme.

Interest community: Carbonarium which is a group where members keep track of their own CO₂ emissions, compared them with one another, implement mitigation measures and pay membership fees based on their calculated CO₂ emissions.

Smart mob community: Carrotmob is a virtual community that aims to reduce CO₂ emissions by using consumer power in a certain way. The idea is to get a large number of consumers to show up and buy goods at the same time and place. This is in relation to a previous bidding contest where different service providers are asked to provide information on how large a share of the profit from the event will go to energy efficiency measures. The overall aim is a win-win situation where neither consumers nor store-owners have to spend extra money but energy reductions are achieved.

4. What key groups and /or geographical areas will be most affected (positively or negatively) by these different social impacts?
 - a) What is the likely impact of the policy measures that we have considered on people's travel behaviours?
 - b) Who and where will be most affected by these and how?

The paper does not consider key groups and / or geographical areas.

However, (AP point rather than in the paper) it is worth noting that in well-being surveys (DEFRA) socio-economic groups D and E rate the community aspects of their lives more highly than socio-economic groups A/B/C. Climate change measures that tap into these community aspects could therefore, potentially, be easier and bring greater benefits (?) to these groups.

5. How are public attitudes (including acceptability) likely to differ between social groups for both mandatory and voluntary options? How will take-up (and the barriers to take-up) of voluntary measures differ between groups?

The paper does not consider how public attitudes will differ between social groups. However, as identified under question 2 it helps identify how communities could help increase the acceptability of behavioural change measures. For example, with regard to social dilemmas it identifies that Carbonarium provides assurance by creating a community of individuals prepared to change their lifestyle and promote these changes to others, and that the Carrotmob creates assurance by a visible presence of others at events. With regard to issues of helplessness tangible progress is demonstrated with the Manchester is My Planet case study.

6. What will impact (in qualitative terms in absence of quantitative data) of policy options be on the
i) transport behaviours, and ii) CO₂ emissions, of different groups?

The paper does not cover the above.

7. What remaining gaps exist in the evidence base and how could these be filled?

Identifying the role that communities can play in achieving behavioural change is an emerging research area. Research in the transport area is particularly limited. There are therefore a number of research gaps that need to be defined.

Social and Distributional Impacts of Transport Climate Change Policies

Author(s)	Gardiner C. & Hill R.	Year of publication	1997
Title/publication	'Cycling on the Journey to Work: Analysis of Socioeconomic Variables from the UK 1991 Population Census Samples of Anonymised Records1997		
Context			
	<i>Type of study e.g. literature review, survey</i>		
	<i>Geographic – country, region, city</i>		
	<i>Sample size (if relevant)</i>		

1. What climate change policies are we concerned with?

This paper focuses on cycle promotion policies. In particular, it focuses on understanding the socio-economic variables for cycling to work journeys, including consideration of gender, ethnicity, education, and social class.

2. What are the potential key social impacts of different climate change policy options?

- a) For each key potential social impact (bearing in mind Atkins' definition), we need to identify the policies that potentially have the (positive or negative) impact. Where impact is dependent on other factors (e.g. scope or stringency of policy, way in which investment is undertaken), these need to be identified clearly.
- b) Can any disproportionately negative affects be mitigated or positive ones be further maximized? If so, how?

The use of cycling promotion policies potentially has the following social impacts:

- Accessibility
- Severance
- Affordability
- Safety/Personal Safety

Secondary/indirect social impacts (from reduced car use) may also include those on:

- Noise
- Air Quality

However, these social impacts are not specifically discussed within the paper.

3. How will these impacts (positive or negative) differ between different social groups (distributional impacts)?

- a) Are there any disadvantaged groups or areas that may be particularly negatively or positively affected? If so, how?
- b) Can any disproportionately negative affects be mitigated or positive ones be further maximized? If so, how?
- c) To what extent is the impact dependent on the area in which the different social group live?

Not specifically covered by this paper.

4. What key groups and /or geographical areas will be most affected (positively or negatively) by these different social impacts?

- a) What is the likely impact of the policy measures that we have considered on people's travel behaviours?
- b) Who and where will be most affected by these and how?

Not specifically covered by this paper.

5. How are public attitudes (including acceptability) likely to differ between social groups for both mandatory and voluntary options? How will take-up (and the barriers to take-up) of voluntary measures differ between groups?

The paper analyses a range of socio-economic variables from the UK 1991 Population Census Samples of Anonymised Records (SARs) in relation to cycling on the journey to work. This could inform which social groups may benefit from cycling promotion policies.

With regards to gender, the results showed that in the majority of areas the highest proportion of journey to work cycle trips are made by males, particularly in hillier areas. However, where there are favourable environments, the participation rate for females can be higher than that of males (e.g. Cambridge).

The majority of cycling to work trips are undertaken by whites (expected due to the very small ethnic minority populations in some of the study areas). When looking at the relative figures for cycling participation and ethnicity, the participation rates for white and non-white groups are fairly close. However, participation by white groups tends to be consistently higher (with the exception of Cambridge). Further disaggregation revealed that people of black Caribbean origin are more likely to cycle than whites. However, this is in sharp contrast to people of Asian origin, among whom there seems to be no propensity to cycle.

The impact of age, social class and level of qualifications were also considered in the propensity to cycle to work. The analysis revealed that in absolute terms, cycling trips to work are primarily made by people without higher-level qualifications. However, when participation rates are considered, the percentage of cyclists among those with qualifications at either Level A or B is generally the highest. This is not the case for certain areas though, which are flat and relatively rural, with an established cycling tradition among lower income groups.

Areas with the highest overall participation in cycling were also found to have a higher percentage of cyclists in each social class. It was noted that areas with established cycling tradition (e.g. Cambridge, York), continue to have a relatively high percentage of cyclists in the part-skilled and unskilled classes.

The overall participation rate in cycling was found to typically decline with the age of the cohort.

6. What will impact (in qualitative terms in absence of quantitative data) of policy options be on the
i) transport behaviours, and ii) CO2 emissions, of different groups?

Not specifically covered by this paper.

7. What remaining gaps exist in the evidence base and how could these be filled?

Further research is required to determine whether in situations where there is a higher proportion of females cycling than males if this represents a positive choice by women, or whether it is constrained by women's typically lower incomes, poorer access to cars and shorter journey lengths.

Further research to establish why cycling among Asian groups in Britain should be so low, especially when cycling is well established in the parent cultures.

Social and Distributional Impacts of Transport Climate Change Policies

Author(s)		Year of publication	2009
Title/publication	Review Cycle demonstration towns		
Context			
	<i>Type of study e.g. literature review, survey</i>		
	<i>Geographic – country, region, city</i>		
	<i>Sample size (if relevant)</i>		

1. What climate change policies are we concerned with?

Improving cycling infrastructure
 Increased marketing of cycling

2. What are the potential key social impacts of different climate change policy options?

- a) For each key potential social impact (bearing in mind Atkins' definition), we need to identify the policies that potentially have the (positive or negative) impact. Where impact is dependent on other factors (e.g. scope or stringency of policy, way in which investment is undertaken), these need to be identified clearly.
- b) Can any disproportionately negative affects be mitigated or positive ones be further maximized? If so, how?

The key social impact of cycling policy are increased physical activity.

3. How will these impacts (positive or negative) differ between different social groups (distributional impacts)?

- a) Are there any disadvantaged groups or areas that may be particularly negatively or positively affected? If so, how?
- b) Can any disproportionately negative affects be mitigated or positive ones be further maximized? If so, how?
- c) To what extent is the impact dependent on the area in which the different social group live?

4. What key groups and /or geographical areas will be most affected (positively or negatively) by these different social impacts?

- a) What is the likely impact of the policy measures that we have considered on people's travel behaviours?
- b) Who and where will be most affected by these and how?

5. How are public attitudes (including acceptability) likely to differ between social groups for both mandatory and voluntary options? How will take-up (and the barriers to take-up) of voluntary measures differ between groups?

Social classes

Respondents in higher social classes were generally more likely to have cycled in the last year, but there was an increase in propensity to cycle between before and after surveys across all social grades. Those living in households with children showed a greater increase (+6%-points) than in those living in households without children (+3%-points).

Age

The largest changes in behaviour appear to have come from people in the 'middle' and 'older' age groups (Figure 2). This is encouraging because, in general, the health benefits derived from taking up cycling are likely to be more pronounced for older age groups.

Gender

Cycling levels had increased amongst both male and female respondents, by a similar number of percentage-points.

6. What will impact (in qualitative terms in absence of quantitative data) of policy options be on the i) transport behaviours, and ii) CO₂ emissions, of different groups?

See above. No information on the number of Kms saved. There will be some impact on CO₂ but as cycling mainly replaces short trips the impact will be low.

7. What remaining gaps exist in the evidence base and how could these be filled?

More statistical information on CO₂ savings and specific groups.

Author(s)	D. Gorman, M. J. Douglas, L. Conway, P. Noble and P. Hanlon	Year of publication	2003
Title/publication	Transport policy and health inequalities: a health impact assessment of Edinburgh's transport policy'		
Context			
	<i>Type of study e.g. literature review, survey</i>		
	<i>Geographic – country, region, city</i>		
	<i>Sample size (if relevant)</i>		

1. What climate change policies are we concerned with?

The paper uses Health Impact Assessment (HIA), using a rapid assessment methodology with key policy stakeholders, to identify the links between the transport infrastructure of Edinburgh City and the health and well-being of its residents. It considers three financial scenarios for transport i) £0.7 million per annum; ii) £6.5 million (Maximum available from City Council funds); iii) £29 million (would require road tolling to be introduced).

2. What are the potential key social impacts of different climate change policy options?

- a) For each key potential social impact (bearing in mind Atkins' definition), we need to identify the policies that potentially have the (positive or negative) impact. Where impact is dependent on other factors (e.g. scope or stringency of policy, way in which investment is undertaken), these need to be identified clearly.
- b) Can any disproportionately negative affects be mitigated or positive ones be further maximized? If so, how?

The main impacts of transport on health are identified as:

- i) Road traffic accidents
- ii) Physical activity
- iii) Access to goods and services
- iv) Community networks
- v) Pollution

The paper finds that a Scenario 1 funding regime would in the negative social impacts associated with transport and have a negative impact on all groups but that deprived groups would be the worst affected, as they are more reliant on public transport and may be forced into car purchases if this was under-funded. Scenario 3 offered greater opportunity to fund public transport and cycling and walking. This was seen to be beneficial for all but with the most benefits for deprived groups.

3. How will these impacts (positive or negative) differ between different social groups (distributional impacts)?

- a) Are there any disadvantaged groups or areas that may be particularly negatively or positively affected? If so, how?
 - b) Can any disproportionately negative affects be mitigated or positive ones be further maximized? If so, how?
 - c) To what extent is the impact dependent on the area in which the different social group live?
- i) Road traffic accidents (RTA) - Morbidity and mortality rates for motor vehicle traffic accidents are higher in lower socio-economic groups. Pedestrian fatality rates for UK children of

unskilled parents are five times higher than those of professional parents. Lothian, children from disadvantaged areas have RTA rates seven times higher than affluent children.

- ii) Physical activity - Scottish Work has estimated that if regular physical activity became the norm, around one third of all coronary heart disease and stroke could be avoided, and in adults aged 45 years and over, just under one-quarter of non-insulin-dependent diabetes and over half the hip fractures could be avoided. Additional benefits of regular physical activity, especially to older adults, include improvement of co-ordination, balance, mobility, functional capacity, and grip and leg strength. Mental health can also be greatly affected, with higher self-esteem improved cognitive function all associated with increased levels of physical fitness. The symptoms of common mental health conditions such as stress, depression and anxiety can be relieved by physical activity, which has great potential to reduce ill health and increase well-being.
- iii) Access to goods and services – lack of easy access to jobs, services and food shops disadvantages people and reduces their well-being. Low income households on Edinburgh's [peripheral estates are particularly affected because of their low levels of car ownership.
- iv) Community networks -. Heavy road traffic can divide communities, reduce opportunities for children's independent social contacts, worsen quality of life and be associated with lower local social support, which is related to higher mortality in the elderly and to other health events. Transport policies can have an effect on social interaction within neighbourhoods. Studies have demonstrated that in streets where there is heavy traffic, there is less interaction between neighbours. This lack of social interaction can have impact on social support, which in turn impacts on health. Having a good social network can, for example, reduce a person's risk of coronary heart disease, depression or susceptibility to infection. The lack of such social support has been associated with higher mortality rates from all causes.
- i) Pollution - Exposure to air pollutants is known to be related to respiratory and cardiovascular diseases, and contains carcinogenic substances

The paper recommends that good public transport should be designed for everyone, avoiding the need for special arrangements. Transport policy overlaps with land-use planning when public policy is trying to promote community networks. Good land-use planning is increasingly recognized as crucial in light of its effects on health where residential and economic development are concerned.

4. What key groups and /or geographical areas will be most affected (positively or negatively) by these different social impacts?
 - a) What is the likely impact of the policy measures that we have considered on people's travel behaviours?
 - b) Who and where will be most affected by these and how?

The paper identifies that a lack of suitable transport (including the cost of transport, vehicle design, inadequate service levels, inadequate and poor staffing, inaccessible housing and facilities, and road safety) is a major factor in certain groups having fewer opportunities.

Elderly and disabled people are identified as particularly vulnerable, especially those with permanent mobility difficulties. Others may experience temporary difficulties, such as parents with young children and shoppers with heavy bags. Low income households on urban peripheral estates are also seen as at risk of accessibility difficulties if they do not own a car.

5. How are public attitudes (including acceptability) likely to differ between social groups for both mandatory and voluntary options? How will take-up (and the barriers to take-up) of voluntary measures differ between groups?

Not covered by this report

6. What will impact (in qualitative terms in absence of quantitative data) of policy options be on the i) transport behaviours, and ii) CO2 emissions, of different groups?

The paper implies that affluent people will drive less as a result of car restraint and road user charging measures and most deprived people will benefit from the reduced congestion, better air quality and public transport improvements. However, this is based on opinion only and there is no actual evidence of these responses.

7. What remaining gaps exist in the evidence base and how could these be filled?

There is no actual evidence of the affects that were identified through the HIA and these would need to be validated through empirical studies.

Social and Distributional Impacts of Transport Climate Change Policies

Author(s)	Dr Tim Jones & DfT	Year of publication	2008 2007
Title/publication	The Role of national cycle network traffic-free paths in creating a cycling culture; The case of NCN route 5 Stafford DfT Cycling Personal Travel Factsheet 2007		
Context			
	<i>Type of study e.g. literature review, survey</i>		
	<i>Geographic – country, region, city</i>		
	<i>Sample size (if relevant)</i>		

1. What climate change policies are we concerned with?

The development of the National Cycle Network (NCN) and traffic free routes in particular

2. What are the potential key social impacts of different climate change policy options?

- a) For each key potential social impact (bearing in mind Atkins' definition), we need to identify the policies that potentially have the (positive or negative) impact. Where impact is dependent on other factors (e.g. scope or stringency of policy, way in which investment is undertaken), these need to be identified clearly.
- b) Can any disproportionately negative affects be mitigated or positive ones be further maximized? If so, how?

The positive social impacts of increased cycling as a result of the development of the NCN are:

- Improved accessibility
- Affordability transport
- Improved health

There are no negative social impacts resulting from the development of the NCN.

3. How will these impacts (positive or negative) differ between different social groups (distributional impacts)?

- a) Are there any disadvantaged groups or areas that may be particularly negatively or positively affected? If so, how?
- b) Can any disproportionately negative affects be mitigated or positive ones be further maximized? If so, how?
- c) To what extent is the impact dependent on the area in which the different social group live?

To be able to reap the positive social impacts, one needs to be able to cycle. A survey of a representative sample of 1000 AA members found that only 8% reported not being able to cycle and these were more likely to be women, London residents or those in the DE social groups (which typically includes a greater proportion of older people) (Jones, page 110).

So although the vast majority of residents can cycle, over two thirds (69%) of people say they cycle less than once a year or never (cycle fact sheet). The proportion of population that is unlikely to cycle is unevenly distributed:

Gender

Women make shorter commuter journeys than men but cycle less and this is attributed to time constraints imposed because of greater household responsibilities (Jones, page 110). In addition, women are more likely to express concerns about safety (85%) than men (61%) (Cycle Fact Sheet). Women are more inclined to take up cycling when it seems safe and generally accepted, such as in places like Cambridge, Peterborough and York (Jones Page 111).

Income

People living in households with lower levels of income make, on average, fewer bicycle trips and travel shorter distances by bicycle than those in higher income households. On average people in the highest income quintile cycle 49 miles per person per year compared with 29 miles among people in the lowest income quintile (Cycle Fact Sheet). However, Jones states that the link between social economic classification and propensity to cycle is difficult to ascertain (page 114) and mentioned various research studies that found no clear link between socio-economic classification and propensity to cycle to work.

Age

A Scottish Household Survey categorised age groups in three life cycle categories (low, medium high propensity to cycle) with high earners without children and retired people in the low group and students, those in-between jobs and part-time workers without children in the high propensity group (Jones, page 114).

Ethnicity

Transport for London found no difference in the proportion of cyclists and non cyclists by ethnicity in its study to identify the 'near market' for cycling. However, a Dutch study found that differences in cultural tradition possibly related to ethnic origin do appear to influence propensity to cycle in the Netherlands (Jones, page 116).

4. What key groups and /or geographical areas will be most affected (positively or negatively) by these different social impacts?
 - a) What is the likely impact of the policy measures that we have considered on people's travel behaviours?
 - b) Who and where will be most affected by these and how?

Even in a town with a significant off –road section of the NCN, only one in four respondents had heard of the NCN. The research results indicated that the availability of a traffic-free path providing direct access to the town centre has little effect on strength of intention amongst local residents to make practical journeys by cycle (Jones Page 322).

The study therefore concludes that provision of significant lengths of National Cycle Network urban traffic-free cycle routes alone are insufficient to encourage a shift from car travel to cycling for everyday practical journeys. A much broader approach is required that ensures that the wider transport network is made safer for cycling in order facilitate short journeys by cycle across a much wider demographic than is currently the case in UK towns and cities (Jones Page 303).

There is some evidence to suggest that females and other groups exceptionally worried about safety would benefit more from cycling facilities as the research concluded that provision of cycling facilities will offer the possibility of cycling to more people, particularly those who are concerned about cycling in traffic (Jones page 302).

5. How are public attitudes (including acceptability) likely to differ between social groups for both mandatory and voluntary options? How will take-up (and the barriers to take-up) of voluntary measures differ between groups?

The study investigated attitudes towards cycling. The research indicated that older respondents more likely to place importance on measures to reduce the impact of motor traffic in built up areas and support the use of bicycles for short journeys instead of using the car (page 219). It also showed that a much higher proportion of females believed cycling to be impractical and dangerous than males.

6. What will impact (in qualitative terms in absence of quantitative data) of policy options be on the i) transport behaviours, and ii) CO2 emissions, of different groups?

The review suggests that a combination of infrastructural, societal and individual changes are required in order to facilitate cycling for everyday travel. Cycle facilities themselves *may not guarantee more people will cycle* but facilities such as traffic-free paths could help to overcome a significant barrier to cycling identified in the literature viz. fear of cycling in general traffic and provide a convenient alternative to the car for some short journeys (Jones , page 133).

7. What remaining gaps exist in the evidence base and how could these be filled?

The study does not go into details of attitudes to cycling amongst minority groups.

Author(s)	Suzanne King, Mark Dyball, Tara Webster, Angela Sharpe, Alan Worley, Jennifer DeWitt , Greg Marsden, Helen Harwatt, Mary Kimble, Ann Jopson	Year of publication	2009
Title/publication	<i>Exploring Public Attitudes to Climate Change and Travel Choices: deliberative research</i>		
Context			
	<i>Type of study e.g. literature review, survey</i>		
	<i>Geographic – country, region, city</i>		
	<i>Sample size (if relevant)</i>		

1. What climate change policies are we concerned with?

The provision of information and communication strategies with the public. Five different groups were repeatedly convened over a period of ten months. Two of these were with less affluent citizens, tow with more affluent citizens and one with young people 20-29 years.

2. What are the potential key social impacts of different climate change policy options?

- a) For each key potential social impact (bearing in mind Atkins’ definition), we need to identify the policies that potentially have the (positive or negative) impact. Where impact is dependent on other factors (e.g. scope or stringency of policy, way in which investment is undertaken), these need to be identified clearly.
- b) Can any disproportionately negative affects be mitigated or positive ones be further maximized? If so, how?

Not really the focus of this report, which is rather differential attitudes to climate change policies. The study found very little difference in attitudes to climate change or public policy interventions to reduce this between the different socio-demographic groups. This is consistent with most attitudinal surveys which generally do not segment along these lines.

3. How will these impacts (positive or negative) differ between different social groups (distributional impacts)?

- a) Are there any disadvantaged groups or areas that may be particularly negatively or positively affected? If so, how?
- b) Can any disproportionately negative affects be mitigated or positive ones be further maximized? If so, how?
- c) To what extent is the impact dependent on the area in which the different social group live?

The social impacts of climate change and/or transport are not really covered by this report

4. What key groups and /or geographical areas will be most affected (positively or negatively) by these different social impacts?

- a) What is the likely impact of the policy measures that we have considered on people’s travel behaviours?
- b) Who and where will be most affected by these and how?

5. How are public attitudes (including acceptability) likely to differ between social groups for both mandatory and voluntary options? How will take-up (and the barriers to take-up) of voluntary measures differ between groups?

- The report identifies that, whilst a majority of people in **all** socio-economic groups agreed that climate change is caused by human behaviour, those in the highest social grades (AB) were more strongly convinced that this was true than those classified as social grade C1.
- On average, 20-29 year olds differed from other age groups by being less likely to accept that climate change is made worse by their personal contribution. This is supported by the DfT's survey findings that younger people aged 16-24 are less concerned about both the environment and climate change than older age groups
- Those in higher socio-economic groups (ABC1) were significantly more certain that they personally contributed towards climate change than those in lower socio-economic groups (C2D).
- Women frequent drivers were more likely than men to see reductions as practical and they saw themselves as more willing and able to reduce their car use than men.

6. What will impact (in qualitative terms in absence of quantitative data) of policy options be on the i) transport behaviours, and ii) CO2 emissions, of different groups?

The main behaviours people said they would be willing to change were:

- i) Reducing unnecessary trips (particularly shopping trips)
- ii) Living more locally
- iii) Being fuel wise (but this was not currently a factor in car purchase decisions)
- iv) Walking and cycling more in good weather (often said to be preferred to public transport)

Both public transport and car sharing were seen as unreliable and inconvenient.

7. What remaining gaps exist in the evidence base and how could these be filled?

The report found that there were often lifestyle barriers associated with the need to travel quickly between geographically dispersed locations to complete day-to-day tasks (such as going to work and taking children to school), personal autonomy, choice and aspirations. In general, little work has been undertaken on the impacts of aspirational car ownership and use amongst low income groups on future climate change outcomes.

Social and Distributional Impacts of Transport Climate Change Policies

Author(s)	Tom Rye, William Mykura	Year of publication	2009
Title/publication	Concessionary Bus Fares for Older People in Scotland - Are They Achieving their Objectives?		
Context			
	<i>Type of study e.g. literature review, survey</i>		
	<i>Geographic – country, region, city</i>		
	<i>Sample size (if relevant)</i>		

1. What climate change policies are we concerned with?

This paper focuses on concessionary bus fares. In particular, it focuses on understanding behaviour change and traveller attitudes resulting from the introduction of the free concessionary bus travel for older people, and the potential impacts on lower income, socially excluded or disabled elderly groups, rather than the impact that such concessionary fares may have on climate change.

2. What are the potential key social impacts of different climate change policy options?

- a) For each key potential social impact (bearing in mind Atkins' definition), we need to identify the policies that potentially have the (positive or negative) impact. Where impact is dependent on other factors (e.g. scope or stringency of policy, way in which investment is undertaken), these need to be identified clearly.
- b) Can any disproportionately negative affects be mitigated or positive ones be further maximized? If so, how?

The use of concessionary fares potentially has the following social impacts:

- Accessibility
- Severance
- Affordability

Secondary/indirect social impacts (from reduced car use) may also include those on:

- Noise
- Air Quality

3. How will these impacts (positive or negative) differ between different social groups (distributional impacts)?

- a) Are there any disadvantaged groups or areas that may be particularly negatively or positively affected? If so, how?
- b) Can any disproportionately negative affects be mitigated or positive ones be further maximized? If so, how?
- c) To what extent is the impact dependent on the area in which the different social group live?

The concessionary fare policy is specifically aimed at older people and those with disabilities, offering free rather than reduced fare travel for those eligible. The policy option is therefore likely to have a more positive impact on the disadvantaged groups that it is targeting than before it was introduced. It is unlikely that other groups will be negatively affected by the introduction of the policy option.

Whilst the concession is available to those with disabilities, including those under the age of 60, take-up of the pass is still somewhat limited. For example, of the 275,851 disabled people under the age of 60 eligible for the concession in the greater Glasgow Area, only 63,980 passes were issued, a 23% take-up rate, compared to 75.08% take-up amongst seniors and the disabled over 60. This low take-up rate is thought to be due to lack of knowledge about the pass, or that they perceive it will be of no use to them. The mode of transport itself can be viewed as a barrier for those with disabilities, as the physical ability of people to use buses can influence the usefulness to them of the concession and its impact on level of social inclusion.

Other factors affecting the ability to take advantage of the concessionary fare include the available bus services and congestion characteristics within an area. It is thought that in areas where there are higher bus service levels, higher levels of congestion and central area parking charges tend to be associated with a higher demand for bus travel amongst those eligible for the concession.

Car ownership can also affect concessionary ridership – as the number of car owning elderly increases, so concessionary ridership decreases. However, the paper found that more car-owners used the concession after it became free compared to the before situation.

The study also found that new passholders tend to be significantly better off, younger and more car-owning than their counterparts who held passes when concessions were not completely free, casting doubt on the degree to which the extended concessions have had much impact on social exclusion.

4. What key groups and /or geographical areas will be most affected (positively or negatively) by these different social impacts?
 - a) What is the likely impact of the policy measures that we have considered on people's travel behaviours?
 - b) Who and where will be most affected by these and how?

Older people – eligible for free travel on buses, therefore increased affordability and subsequently increased accessibility, reduced severance and potentially increased social inclusion.

Mobility impaired – also eligible for concessionary travel, including those under 60 years of age. However, the mobility impaired may benefit to a lesser extent than other groups depending on their physical ability to use the buses.

5. How are public attitudes (including acceptability) likely to differ between social groups for both mandatory and voluntary options? How will take-up (and the barriers to take-up) of voluntary measures differ between groups?

The paper showed that take-up of the concession varied among those eligible for a variety of reasons, including the following:

- Mobility impaired – Low take-up rates recorded for those under the age of 60, thought to be as a result of lack of knowledge regarding the concession, or it was perceived to be of little benefit to them.
- Income – People with incomes of £500 or less made over 50% more trips than those on incomes of £750-1,000 a month, and twice as many as those on £1,000 or more a month. However, it was also found that wealthier pensioners made more bus trips than they had done previously.
- Car ownership – 60% of those without a car reported making shopping trips often or very often by bus compared to 34% of those with a car.

Generally, the poorest elderly people use the concession and the increase in use by the very poorest as a result of the concession becoming free has been of the order of 30%. However, the paper also found that the new concession has also stimulated bus use amongst retired car owners.

6. What will impact (in qualitative terms in absence of quantitative data) of policy options be on the i) transport behaviours, and ii) CO₂ emissions, of different groups?

i) In some cases the policy option has resulted in newly generated trips (27%), or a mode shift, including from cars (23%) and walking (44%) of older people or mobility impaired.

ii) Not specifically covered by this report. However, the increase in bus use amongst retired car owners could potentially have a positive impact on the reduction of CO₂ emissions for this group.

7. What remaining gaps exist in the evidence base and how could these be filled?

The paper does not consider differences in the take-up of the concession between those older people or mobility impaired who live in rural areas compared to urban areas (and subsequent distribution of social impacts). It can be assumed that bus service frequency and reliability issues are likely to also have an impact on the uptake and use of the concession, whilst it has been identified within the paper that in areas with higher service levels (which could be taken as urban areas) are most likely to be associated with the highest demand. It would therefore be useful to understand whether older people or those with disabilities eligible for the concession who reside in rural areas are also able to benefit from increased accessibility and social inclusion in addition to the issue of affordability.

The paper also mentions that the introduction of the free concession has led to the generation of new trips, and an increase in ridership from those who previously travelled by car or alternative modes, which is likely to have a positive impact on emissions of CO₂. However, the paper also identified that there was a shift towards increased bus travel from those who previously walked, and the free concession also stimulated the generation of new trips. It would be useful to understand the impact that this increase on ridership, if significant in some areas, has led to an increase in demand for bus services (and therefore potentially higher emissions of CO₂).

Social and Distributional Impacts of Transport Climate Change Policies

Author(s)	Institute for European Environmental Policy (Ian Skinner, Dawn Haines, Luisa Senft, Catherine Bowyer, Malcolm Fergusson)	Year of publication	2004
Title/publication	Mobility Services: Setting the policy framework		
Context	<i>Type of publication e.g. journal article, other article, book, book chapter, working paper, report, conference paper, response to government consultation</i>	Report	
	<i>Type of study e.g. literature review, survey</i>	A review of international experience of mobility services, including car sharing and car clubs	
	<i>Geographic – country, region, city</i>	The original focus of the review was Switzerland, Germany and the United States, as well as Scandinavia and the Netherlands. We also decided, however, to look at other major economies belonging to the G7 group of industrialised countries, i.e. France, the UK, Italy, Japan and Canada, as well as any other important leads identified through these reviews.	
	<i>Sample size (if relevant)</i>		

Synopsis of Document

While car clubs are the most widely-quoted example of a mobility service, it is only one of a number of mobility service models that is discussed in the literature. Hence, there is a need to look at the potential role of mobility services in a broader sense in resolving the urban transport problem. One possible vision of an urban future could be where the development of integrated mobility services has improved accessibility, but reduced the amount of travel, for example, through the use of sophisticated internet and associated technologies.

The primary aim of this project, therefore, is to consider how mobility services in their broadest sense could deliver this vision of improved access and reduced travel by examining existing trends and future possibilities, along with the policy instruments, social and other changes that could help to achieve this goal.

The research objectives of this project are to:

- Identify the potential for the full range of services currently encompassed by the term ‘mobility services’;
- Identify their potential role and contribution to a future urban sustainable transport system; and
- Identify the potential role of the policy community and various elements of the transport-related industries in the development of more comprehensive and sustainable mobility services.

1. What climate change policies are we concerned with?

Car sharing – when one person effectively gives another a lift/more than one person travelling in the same car

Car clubs - a collection of cars owned centrally that are used by a number of different people

2. What key groups will be impacted (positively or negatively) by different climate change policy options?
 - a) What is the likely impact of the policy measures that we have considered on people's travel behaviours?
 - b) Who and where will be most affected by these and how?

Whilst there is some information on the impact of car clubs and car sharing on travel behaviour, there appears to be little information on specific social groups.

Baum and Pesch found that environmental aspects were the most common reason for joining a car club service, as it was cited by 70 per cent of respondents (sample size not defined in document). Around two in five respondents (sample size not defined in document) also highlighted the complementarity of car clubs to public transport and the rising costs of car ownership. Muheim found the main reason to be that car clubs met users' mobility requirements (63 per cent – sample size not defined in document), whereas the cost of car ownership and environmental reasons were only mentioned by one in four and one in five people, respectively. Two Dutch studies also investigate the reasons for joining car club schemes, although neither take into account environmental considerations. Both Bosch et al (1998) and Meijkamp (2000) identified the increasing cost of car ownership and the inadequacy of public transport as key reasons for joining a car club scheme (both were cited by around half of the respondents in Meijkamp's study (sample size not defined in document)). Schrader (forthcoming) found that users thought that the principal advantages of car club when compared to owning a car were not having to buy the car in the first place, not having to maintain the car and the range of cars that car club schemes can offer.

Of course it is important to note that participation in a car club scheme does not necessarily mean that users surrender all of their vehicles. Research has suggested that car club schemes have allowed some members to effectively use the shared car as a second car in addition to the one they already own (e.g. Bosch et al, 1998; Meijkamp, 2000). However, these studies also identify significantly more people who do actually give up their car. Similarly, San Francisco's City CarShare scheme claims that 25 per cent of their members have given up their car since joining the scheme, and a further 25 per cent claim that membership has enabled them not to have to purchase a car (Behrendt et al, 2003).

3. What are the potential key social impacts of different climate change policy options?
 - a) For each key potential social impact (bearing in mind Atkins' definition), we need to identify the policies that potentially have the (positive or negative) impact. Where impact is dependent on other factors (e.g. scope or stringency of policy, way in which investment is undertaken), these need to be identified clearly.
 - b) Can any disproportionately negative affects be mitigated or positive ones be further maximized? If so, how?

There appears to be little information on specific social impacts of car sharing and car clubs.

Car sharing addresses car ownership through enabling access to the benefits of car ownership (i.e. flexible availability of a car) without requiring direct personal car ownership. Such schemes may help to bridge a 'gap' between conventional car ownership patterns on one side, and taxis and public transport on the other. These are increasingly put forward as an answer to the problems of urban transport and are often included under the umbrella heading of 'mobility services'.

In 1999 Volvo became involved with a car sharing scheme in Göteborg, Sweden. This scheme it provides cars solely for business use. Volvo established a pool of cars in an area occupied by

several companies. The vehicles were intended for use during the working day; their availability was intended to act as a stimulus for more employees to travel to work by public transport or other sustainable modes of transport, without the excuse of saying they need to drive their car as they may need it for work purposes (Volvo, 1999).

Liselec is an innovative alternative urban transportation system in La Rochelle, France, involving Citroen and Peugeot, set up in September 1999. It comprises a fleet of electric cars parked at strategic locations around the city, such as the train station, the university and the shopping centre. Users access the cars with a smart card, which is paid for in advance. Users can either play a fixed hourly fee or a membership programme that bills for actual use. Vehicles are available 24 hours a day and include a fleet of 50 electric Peugeot 106s and Citroen Saxos. The scheme aims to make it easier to get around the city by extending the range of public transport, whilst at the same time protecting the city environment (Liselec, 2003).

However, some schemes do give car manufacturers opportunities to showcase alternatively powered vehicles and to test out other innovative technologies. Also, car share schemes create a relationship with a new class of motorists – one which might well own their own cars otherwise, but might not purchase a brand new one. Extension of and the development of further schemes is perhaps an indication that the motor industry does see mobility services as providing a viable business opportunity. It is clear that more research needs to be undertaken on the longevity of schemes and the benefits that they can offer to the various parties involved.

4. How will these impacts (positive or negative) differ between social groups (distributional impacts)?
 - a) Are there any disadvantaged groups or areas that may be negatively or positively affected? If so, how?
 - b) Can any disproportionately negative affects be mitigated or positive ones be further maximized? If so, how?
 - c) To what extent is the impact dependent on the area in which the different social group live?

No information on distributional impacts.

5. How are public attitudes (including acceptability) likely to differ between social groups for both mandatory and voluntary options? How will take-up (and the barriers to take-up) of voluntary measures differ between groups?

No information about different social groups.

6. What will impact (in qualitative terms in absence of quantitative data) of policy options be on the i) transport behaviours, and ii) CO₂ emissions, of different groups?

Car Clubs

Behrendt et al (2003) review a number of studies that have estimated the environmental impact of car clubs, including Baum and Pesch (1994), Meijkamp (2000), Harms and Truffer (1998) and Muheim (1998). The conclusion seems to be that car clubs can reduce the negative environmental impacts of private car use and at the same time provide a similar and more equitable level of mobility. The environmental benefits arise from three distinct impacts. First, the fact that cars are shared and not owned results in the need for fewer cars than otherwise would have been the case. While for some car clubs provide access to a car, which had previously not been possible, for others joining a car club scheme leads to them giving up their own car, or avoiding buying a new one. Behrendt et al (2003) quoted figures from the Netherlands, Switzerland and Germany that suggested that car clubs resulted in around 30 to 44 per cent fewer cars. Interestingly, the figure for

the Netherlands was higher for neighbourhood schemes than those schemes run by car rental companies. On the basis of the existing number of participants in car club schemes in these countries, they estimated that car club schemes had resulted in around 30,000 fewer cars than would otherwise been the case. In the US, San Francisco's City CarShare claim that 25 per cent of their members have given up their car since joining the scheme; while Boston's ZipCar claims an equivalent figure of 15 per cent for its members. In addition, ZipCar states that 25 per cent of its membership claim that the scheme enabled them to avoid purchasing a car. This suggests that car sharing can, at least to some people, offer a viable alternative to private car ownership and therefore could have the potential to reduce car ownership in the longer-term (City CarShare 2003, ZipCar 2003).

Second, on average a shared car spends more of its time in use than a private car, as it is used by more people and therefore spends less time idle in car parks and garages. Muheim (1998) and Meijkamp (2000) both estimate that the reduction in the amount of space devoted to parking as a result of car clubs is around 44 per cent. Studies also estimate that the average occupancy of a car club vehicle is around 25 per cent higher (i.e. around 2) than that of a private car, due to the fact that the former are generally not used for commuting journeys, where the occupancy is usually low (Baum and Pesch, 1994; Muheim, 1998). In addition, as a result of its more intense use, car club vehicles are replaced about every alternate year, allowing cars with the latest technology to replace older, less eco-efficient technology more often. However, the fact that shared cars wear out more quickly, as a result of their more intensive use, is potentially an environmental downside for car clubs.

Third, figures suggest that, on average, car club users spend less time travelling by car than do those who have access to a private car. The fact that users are not only paying a monthly or annual membership fee, but also pay for the kilometres driven every time they use the car, makes them more aware of the true average costs of driving. One of the reasons why users drive shared cars less regularly than they would a private car is that, in contrast to a privately owned car, the car club vehicle is not immediately or always accessible. While it is true that car club members who did not previously own a car travel more by car than before, this is usually negated by the fact that those who previously owned a car travel significantly less by car than before. For a number of schemes in Germany, the Netherlands and Switzerland, the average reduction in vehicle mileage by car club members was 28 per cent in the Netherlands, 36 per cent in Switzerland and 42 per cent in Germany (see Table 6.12 in Behrendt et al, 2003). In his study, Meijkamp (2000) found that on average the change in car mileage resulting from joining a car club was 33 per cent on average, with a reduction of 65 per cent from previous car owners, even though around 71 per cent of those joining a club did not previously own a car. However, it is worth noting that if people use a shared car in addition to their private cars, the impacts on the environment are not necessarily positive. For these 'additional users' car clubs can, for example, lead to a 5 per cent increase of their energy requirement (Behrendt et al, 2003). Interestingly, in Meijkamp's review of four schemes, the average number of weekly trips by all modes increased by 10 per cent on joining a car club scheme. While the average number of car trips per week declined by 43 per cent, the use of other modes increased, as the number of cycling trips went up by 14 per cent and train and bus use up by 36 and 28 per cent, respectively. Conversely, experience suggests that the existence of a reliable, accessible public transport system is of significant importance for the success of car club schemes. Muheim (1998) estimates that the environmental impact of car sharing can be in the order of a 30 per cent reduction in energy consumption and carbon dioxide emissions and a 25 per cent reduction in material input.

Car sharing

Liftshare are the UK's leading provider of car sharing services and oversee over 250 schemes with a client base of approximately 36,000 members which is increasing all the time. Whilst registering details on a website does not actually equate to using the service, Liftshare believe that 34 per cent of all journeys registered result in successful matches. From this they calculate that 1,7690,302

miles are currently being saved per year through people using their site and going on to share journeys with other people, and that CO₂ emissions are reduced by 5,000 tonnes (Liftshare, 2003).

7. What remaining gaps exist in the evidence base and how could these be filled?

No information on the users of car sharing/clubs – in terms of users, demographic/income/more car ownership information could be useful.

Social and Distributional Impacts of Transport Climate Change Policies

PART A – BASIC INFORMATION			
Author(s)	Carplus National Rural Transport Partnership	Year of publication	2004
Title/publication	Putting cars in the mix: Development and Impacts of Car Clubs in Rural Areas		
Context	<i>Type of publication e.g. journal article, other article, book, book chapter, working paper, report, conference paper, response to government consultation</i>	Report	
	<i>Type of study e.g. literature review, survey</i>	Review of car club projects	
	<i>Geographic – country, region, city</i>	England	
	<i>Sample size (if relevant)</i>	6 car clubs investigated, with survey responses from 36 members	

Synopsis of Document

The Carplus National Rural Transport Partnership was conceived to set up demonstration car club projects in a variety of rural areas. It aimed to address the joint issues of social exclusion through tackling transport poverty and increasing car use in rural areas through providing viable alternative transport options to private car use. As a demonstration programme, it was designed to investigate how car clubs are accommodated in communities and organisational structures, and their impacts, especially on the travel behaviour of their members.

Thirteen projects were accepted into the programme; after 2 ½ years, six were operational clubs comprising 98 members using 15 cars. These operated across 31 rural communities with populations between 4,000 and 23,000, and were run under a variety of management set-ups. The clubs comprise between 1 and 4 cars and cover between 1 and 16 villages or small towns. A further two clubs were due to launch in June 2004 (with three cars each) and another was due to launch in early 2005. Three of the projects did not progress beyond feasibility study stage, and a further project was undergoing development in a new direction. The programme showed that the car club model is readily adaptable to a wide variety of rural contexts, resulting in a range of club sizes, management set-ups, and styles.

This report is one of the outputs from the Carplus National Rural Transport Partnership. Its aims are largely threefold: to review and assess how the rural car club programme evolved and progressed, to summarise and evaluate as far as possible the lessons from the programme, as informed by the results from monitoring the club development and members, and to synthesise these to identify strategic pointers for future development and strategy of car clubs in rural England.

Early in the document it is specified that 36 survey forms were returned from car club members: it is therefore assumed that this is the number upon which later analysis is based.

1. What climate change policies are we concerned with?

Car clubs - a collection of cars owned centrally that are used by a number of different people

(The document notes that club cars were parked in reserved bays within easy distance of where members live or work, and can be booked for as little as an hour or up to a few days.)

2. What key groups will be impacted (positively or negatively) by different climate change policy options?
- c) What is the likely impact of the policy measures that we have considered on people's travel behaviours?

d) Who and where will be most affected by these and how?

Recruitment rates

The initial size of the rural clubs was determined primarily through the feasibility studies which were based on surveys of the local community. An assessment was made of the potential catchment which was married to a business plan which also takes into account estimated recruitment rates, costs (membership rates, mileage and hourly charges) and utilisation (number of hires/member/month, length of use per hire (hours and miles driven)). A rule of thumb which emerged from the older urban clubs is that 40% (bookable) time utilisation is optimal – lower than this does not reap sufficient income, and higher leads to booking congestion and failed bookings. “Bookable” time is usually between 12 – 16 hours in any 24 – overnight use is often “free” to members who use the car over longer time periods (Note that privately owned cars are used on average for 2.4% time).

There is strong evidence that recruitment to clubs undergoes a peak on launch followed by a tailing-off to a more stable recruitment rate. Figure 1 (pasted in below) shows all of the available UK data for recruitment to clubs. It suggests that:

- Recruitment and expansion to rural clubs are operating in a very similar way as to non-rural clubs
- For the first 18 months, rural clubs have recruited, on average, 8.2 members per car per year.
- Other UK clubs seem to reach a stable number of members/cars after about four years. This would seem to indicate that it takes this long for the club to become established to the point that it can expand sustainably based on local demand.
- Data from other clubs show a distinct seasonal pattern. This is outlined and discussed further in the “Lessons for targeting recruitment” section.

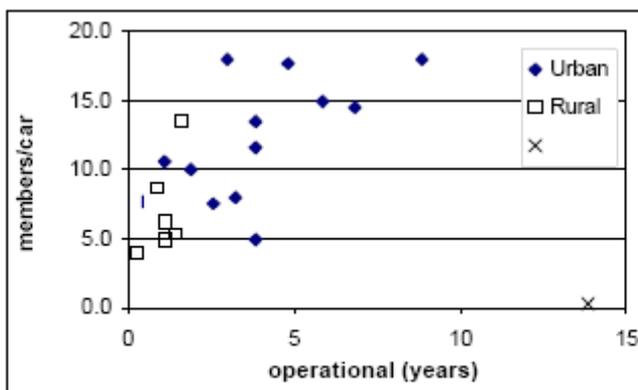


Figure 1: Recruitment rates of all UK car clubs

Who joins rural car clubs?

Car Club development in the UK was, until recently, largely a “bottom-up” process. This led to similar types of people joining car clubs as they have emerged from a certain type of neighbourhood. Though the set up of the rural clubs was still, to an extent, bottom-up, their catchment areas covered many different types of neighbourhoods. This is reflected in the types of people who joined. Compared to UK clubs in urban areas:

- Members were slightly older (46.7 years in rural areas compared to 41.8 years in urban areas).
- Nearly twice as many women as men joined (62.9% vs 37.1%). This corroborates anecdotal reports from club managers that women tend to be more enthusiastic about the car club idea, and seem to be more important in determining opinions within households regarding travel

behaviour. Related to this are the complex gender issues regarding (private) car ownership and identity in which men tend to be more tightly wedded to their *own* car rather than the function of a car.

- Members were from a much broader range of social classes; there were significantly more housewives, retired people and people working in administrative and associate professional roles. As yet no managers had joined rural clubs (compared with 22% in urban) and there are only about half of the proportion of professional classes when compared to their urban cousins.

While these headline findings look clear, they are probably inter-related. For instance, the age profiles of the population in rural areas is possibly broader but older than in the sorts of neighbourhoods where urban clubs set up; the lower incidence of managerial and professional social classes in rural clubs may be related to fewer such career opportunities in rural areas. In spite of this, these findings provide strong evidence either that the appeal of car clubs is much broader than we have known up to now, or that they appeal to a different type of person in rural compared to urban areas; it is not yet possible to distinguish which of these is the case, but the former could be tested with a focused demonstration programme in certain types of urban areas.

The rural monitoring data also report the following characteristics of car club joiners, although there are no equivalent non-rural data against which to compare them:

- The typical household income of members was between £20,000- £30,000. The average income was c. £25,200 which compares to the national average (1999 – 2002) of £26,520. There were significant numbers of people with both low and high incomes who joined the rural clubs.
- The household composition data suggest that people tended to join car clubs from larger than average households.
- Car club households had an average of 2.3 people compared to a national average of 1.5. This suggests that the car club concept tended to appeal to families rather than smaller households.
- 77.1% of the members owned their own home, the other 22.8% living in private rented accommodation.
- 76.8% of people on joining were from households with a car comprising 68.8% of households which owned a car and a further 8% with a company car. Of households with a car, 92% had one car, the other 8% having two.
- Of all members' households (i.e. whether they had a car or not), on joining, 6.5% were considering getting a car in the next six months (either as a replacement or new). Of households with a car already, 28.0% were considering getting rid of one. Taken together, these are credible evidence that the car club is providing a viable alternative to private car ownership.
- Only one of the respondents (2.8%) was not of white Caucasian background.

Why & when do people join?

During the process of recruiting members to clubs, it became possible to characterise the types of responses that are received from different types of people. These can be summarised as:

- Easy/early adopters: These tend to be keen about the idea, fairly “green” and/or active in other community initiatives.
- Interested but not in the near future: They tend to be like the “early adopters”, but for some reason their current situation means that joining is not practicable at the moment.
- It's a good idea but doesn't really fit me: a very common response
- It's a good idea but it won't work here
- Possibly, but don't want to think about it / too busy.
- Don't understand idea: confuse the idea with car sharing, and don't see why it's applicable to people who currently own a car.
- Threatened by the idea – a(nother) threat to private car liberty (like speed cameras).

There is significant evidence to suggest that people joined the club in response to some sort of trigger. 77% of joiners had undergone some sort of life change recently, influencing their decision to join. Of these 77%, 25% involved moving house, 19.4% selling a car, 13.9% changing job and 8.3% to do with changes in personal relationships. This becomes significant when considering targeting marketing and recruitment efforts. Data from the other UK clubs for 2001 and 2002 show that people tend to join car clubs mainly in the autumn, but also in the spring. The autumn peak is explained by such factors as people considering whether their car will get through (or be reliable during) the winter, and getting to grips with finances as summer holidays pass and Christmas looms.

2. What are the potential key social impacts of different climate change policy options?
 - a) For each key potential social impact (bearing in mind Atkins' definition), we need to identify the policies that potentially have the (positive or negative) impact. Where impact is dependent on other factors (e.g. scope or stringency of policy, way in which investment is undertaken), these need to be identified clearly.
 - b) Can any disproportionately negative affects be mitigated or positive ones be further maximized? If so, how?
3. How will these impacts (positive or negative) differ between social groups (distributional impacts)?
 - a) Are there any disadvantaged groups or areas that may be negatively or positively affected? If so, how?
 - b) Can any disproportionately negative affects be mitigated or positive ones be further maximized? If so, how?
 - c) To what extent is the impact dependent on the area in which the different social group live?
4. What key groups and /or geographical areas will be most affected (positively or negatively) by these different social impacts?
 - a) What is the likely impact of the policy measures that we have considered on people's travel behaviours?
 - b) Who and where will be most affected by these and how?
5. How are public attitudes (including acceptability) likely to differ between social groups for both mandatory and voluntary options? How will take-up (and the barriers to take-up) of voluntary measures differ between groups?

Questions 2 to 4 have been addressed together.

Most private car owners use their car as the default option for their transport needs. This stems mainly from the perception that the car is both easier and cheaper to use than other available options, but also its availability means that other options are usually not even considered. Evidence from the UK and overseas reveals that replacing private cars with club cars significantly benefits public transport; not having the car as a default option means that members are more likely to evaluate the best way to make each journey, and indeed whether the journey is actually worthwhile. This results in a natural shift to an increase in the use of buses and trains, and members walking and cycling more.

There is clear anecdotal evidence from individual members and the manager of OurCarYourCar (one of the car clubs investigated) that their use of public transport increased at the expense of their car use after joining. It is demonstrable that use of the club vehicle is at a much lower level and has

not simply been a like-for-like replacement of their private car. This points to car clubs acting as effective “seeds” for unlocking the potential of other transport initiatives and provision in an area. The co-ordinated mix of transport options which *include* a club car provide a viable and practicable alternative to private car use; a shift from predominantly private car use to public transport would be too alien to many people without the club car being an option. This means that the effects of the car club on transport extend well beyond the use of the club cars themselves.

Formal development of integration between car clubs and public transport is still in its infancy. As yet, it is not normal for there to be infrastructure in place in rural areas which allows seamless links between buses, trains and car club vehicles. Few rural areas have integrated transport nodes such as bus stations or travel centres that allow easy “mode switching”, nor is single ticketing, integrated travel cards or billing available. Clubs have tried, wherever possible, to locate the car stations close to rail stations and bus stops, but this is as far as is achievable at present.

Suggested mutual benefits with community transport:

- Diversification of vehicle use, user types and uses - increases vehicle use efficiency
- Contact between different groups within the community – cross-fertilisation of influences and ideas
- Car clubs feed costs of private transport back into the local economy – car use may fund community transport worker
- Together, car clubs and community transport may provide the core of a local one-stop transport advice centre.

Lessons for targeting recruitment

The above findings provide distinct pointers which may be useful in targeting recruitment to rural clubs, though it would be simplistic to rely on them alone to plan a recruitment strategy: targeting environmentally aware early-40-year-old mothers who are moving house risks missing several important factors:

- It may be the case that these sorts of people joined the clubs because the recruitment methods used to date (plus perception of the club, networks through which recommendations were made, image of publicity materials etc) tended to (deliberately or not) attract such people. The risk is to ignore a quite different approach which may attract e.g. younger males from smaller households - an example of a type of person who is currently under-represented.
- The data present a profile of those who joined in the early stages of club operation and may not fully represent the more mainstream members who join later.

6. What will impact (in qualitative terms in absence of quantitative data) of policy options be on the i) transport behaviours, and ii) CO2 emissions, of different groups?

Use of club cars

The nature of how the club vehicles were used varied widely between clubs, between different cars in the same club and at different times of the week and year. However, the following indicate rough utilisation characteristics:

- Cars were generally used for about 5 hours, although this could range between 1 and 34 hours
- The mileage covered per hire was typically 20 miles, although this ranged from 4 to 548
- People tended to book the cars a few days in advance for longer journeys, or a few hours for more spontaneous trips. Some members turned up and booked on the spot.

- There were no consistent peaks or troughs in demand for the vehicles.

Impacts on travel behaviour

It is still largely too early to be able to evaluate the impacts of the car club on travel behaviour, communities, or use of local services based on primary evidence; only 6 repeat surveys of travel behaviour and local service use for people who had joined more than six months previously had been received by the end of the programme.

Two lines of evidence provide indicative insights on how the clubs may be having an impact on people’s travel habits:

- The intention of 28% of car-owning joiners to get rid of a car translates to a possible reduction in 7 private cars. Over the time period of monitoring, there were 7 club cars in the clubs involved, which suggests that to date, club cars are replacing private cars at a 1:1 ratio.
- Evidence from Bristol and clubs in other countries suggests that one car club car is responsible for taking about 6 private cars off the road. The discrepancy may be (i) a function of the relatively small sample size of rural club joiners, (ii) related to the nature of “early adopters” – i.e. that they are generally quite “green” and may already have reduced their private car use as much as practicably possible already, (iii) timescale – Bristol has higher figures probably because it has been going longer and there is greater confidence that members can rely on the car club sufficiently to “take the chance” of getting rid of a car.
- Car utilisation data show that:
 - Car use is gradually picking up. This varied widely between clubs, and Figure 9 (below) illustrates changes in utilisation rates for the first three rural clubs.
 - The club managers suggested that there was a seasonal component which explained the apparent reduction in car use into autumn and early winter for *Moorcar* & *OurCarYourCar*. This may be related to the autumn peak in recruitment suggested above.
 - Though not formally significant, the increase in utilisation seems to be increasing faster than the increase in membership (apart from in *Moorcar* for the data available). This would mean that once people joined the club, they tended to start using the cars more and more, suggesting that their travel behaviour was indeed adjusting as a result of the club’s existence.

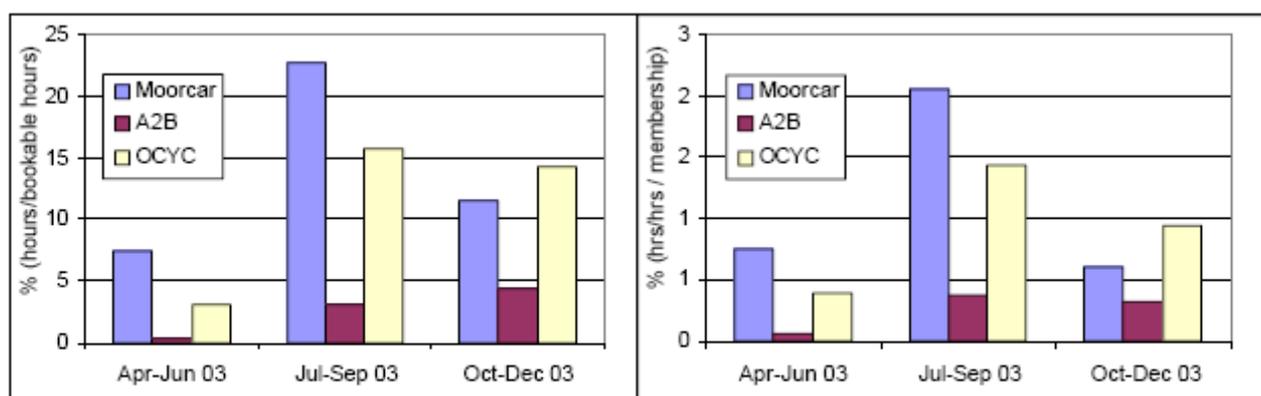


Figure 9: Changes in car club utilisation rates for Moorcar, A2B & OurCarYourCar over three quarters. (a) hours/bookable hours, (b) scaled for changes in membership

Impacts on communities

The impact of the clubs on broader aspects of communities is impossible to quantify. However, during the development and subsequent operation of the club, evidence has emerged that their impacts go beyond that of modal shift:

- A new type of “community glue”; the development of clubs tends to bring together sectors of the community who would not necessarily naturally find a common focus. The people who may find interest in a car club (even if they do not finally join) were varied, as reflected in the social classifications of those who joined.
- The club aspect of the projects implicitly involves sharing resources. Combined with a sense of involvement in an innovative idea which provides environmental and communal benefit (whilst being attractive to the mainstream), these resulted in a distinct sense of community pride among those involved.
- The prospect of the clubs ultimately becoming financially sustainable means that they represent a truly sustainable way of funding an important part of the local transport system without having to rely on subsidies. This also provides the prospect of generating sufficient funding to secure a post which can help to provide continuity in the management of community initiatives, such as community transport.
- The novelty, broad appeal and success of car clubs means that they encourage community groups to think laterally and gives confidence for them to put their shoulder behind other novel initiatives.

Experience of car club development in other countries (especially Germany and Switzerland) suggests that as the idea catches on, car clubs tend to amalgamate, recruitment rates stabilise and clubs become more integrated with other transport options. On a national scale, the expansion of clubs in the UK is broadly similar to that which occurred in Switzerland. Ten years on, the Swiss *Mobility* club has 52,000 people sharing approximately 1,700 vehicles at 950 locations in 400 communities across the country. The rural programme has provided a key foundation which will allow a similar expansion to take place in the UK.

7. What remaining gaps exist in the evidence base and how could these be filled?

Not much information available relating to the amount of miles and CO₂ emissions taken off the road.

The following gaps were identified in the document.

The majority of monitored feedback relating to the club development and operation is complete and accurate. However, the return of monitoring forms from members was more problematic, as often the case with optional monitoring methods. Members were asked to fill out monitoring forms on joining and at 6-monthly intervals. By the end of the programme, the return rate of the joining member surveys was 37% (36 returned); Only 6 of the 6-monthly review surveys had been returned.

The two main implications of this are:

- The sample may not be representative of the types of people who have joined. For instance, those who were motivated to join the club to use it as a local service rather than through a deeper sense of community or environmental responsibility would probably be less likely to be prepared to dedicate time to filling in the monitoring forms. It is not possible to quantify this self-filtering effect at this stage.
- It was not possible to compare before / after behaviour (travel, use of local services).

The survey findings provide strong evidence either that that the appeal of car clubs is much broader than we have known up to now, or that they appeal to a different type of person in rural compared to urban areas; the former could be tested with a focused demonstration programme in certain types of urban areas.

Social and Distributional Impacts of Transport Climate Change Policies

Author(s)	DfT (Chloe Robinson and Alun Humphrey of the National Centre for Social Research and Tracey Budd of the Department for Transport)	Year of publication	2008
Title/publication	Public Experiences of Car Sharing		
Context	<i>Type of publication e.g. journal article, other article, book, book chapter, working paper, report, conference paper, response to government consultation</i>	Report	
	<i>Type of study e.g. literature review, survey</i>	Survey	
	<i>Geographic – country, region, city</i>	Great Britain	
	<i>Sample size (if relevant)</i>	1,530	

Synopsis of Document

This report examines the extent of car sharing in Great Britain, and how this varies across different socio-demographic groups. It also examines the reasons why people car share and the nature of car sharing trips. Both informal and formal car sharing arrangements are included, though it should be noted that the vast majority of car sharing is informal.

The results are based on a module of questions included in the NatCen Omnibus Survey in July to September 2007. The NatCen Omnibus is a random probability survey of adults aged 16 or more living in private households in Great Britain. The July to September Omnibus interviewed 1,530 adults face-to-face in their own homes between 19 July and 17 September. The response rate was 55%. The questions were commissioned and designed by the Department for Transport.

1. What climate change policies are we concerned with?

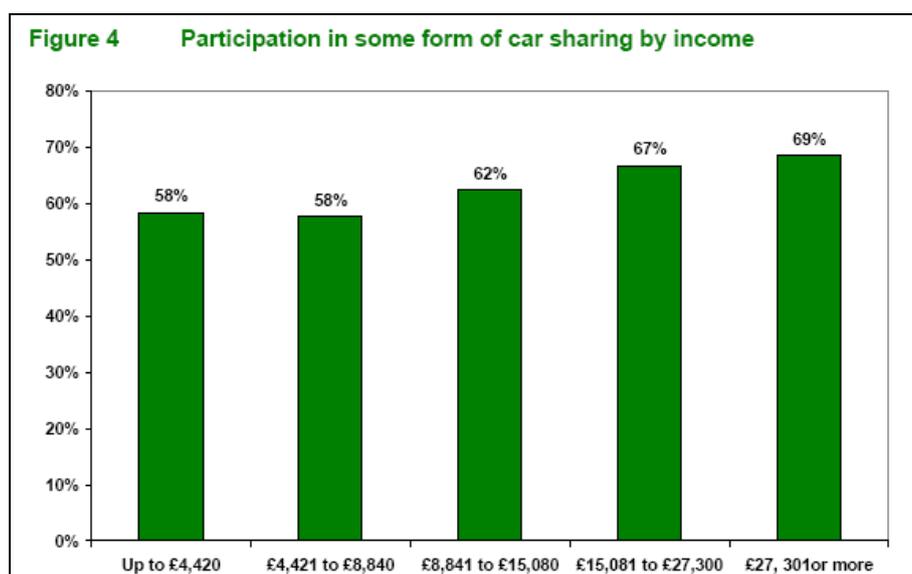
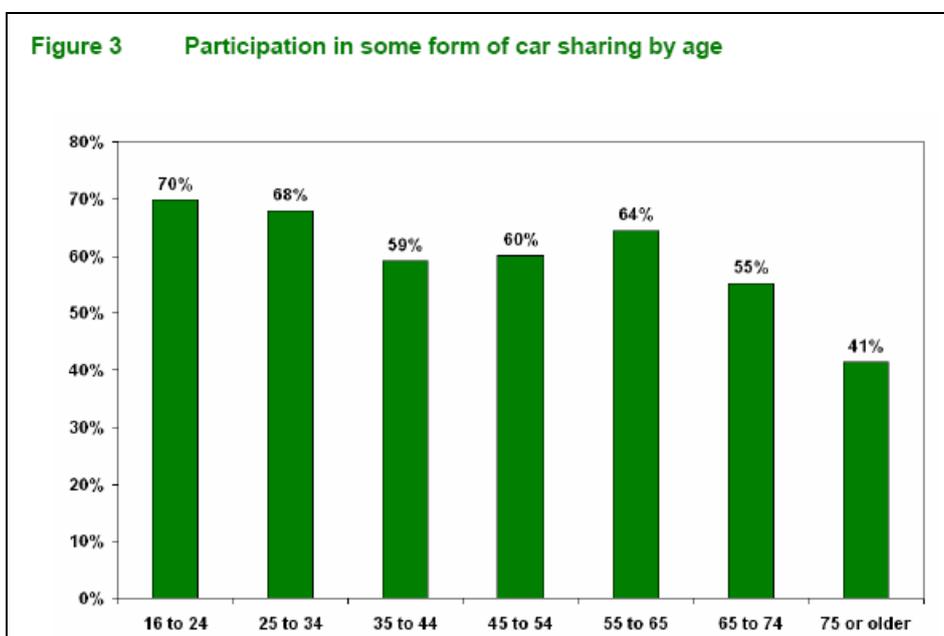
Car sharing – when one person effectively gives another a lift/more than one person travelling in the same car.

2. What key groups will be impacted (positively or negatively) by different climate change policy options?
 - a) What is the likely impact of the policy measures that we have considered on people's travel behaviours?
 - b) Who and where will be most affected by these and how?

The questionnaire assessed the extent of car sharing in several ways. Those who had travelled as a car passenger in the last month were asked whether or not they had *received a lift* from someone who did not live in the same household as themselves during the period, while those who had travelled as a car driver were asked if they had *given a lift* to someone outside their household. Respondents were instructed to include both informal arrangements and formal car-sharing arrangements. All respondents were also asked whether they were a member of a formal lift-sharing scheme operated either by an employer or another organisation.

- Nearly two-thirds (61%) of respondents who had travelled as a passenger in the past month said they had *received a lift from someone outside their household* during the period.
- A similar proportion of those who had driven in the past month said they had *given a lift to someone who was not part of their household* during that time (63%).
- Nationally, 61% of all respondents either *give a lift to or received a lift from someone who did not live in their household* in the month prior to interview.

- Most lift-sharing is based on informal arrangements. Just 1% of respondents said that they were a member of a formal scheme run by their employer or another organization.
- The following groups were most likely to have participated in some form of car sharing, either giving or receiving lifts in the month prior to interview or belonging to a formal car share scheme:
 - Those aged between 16 and 24 (70%) and between 25 and 34 (68%);
 - Those in the highest income group (69% of those with a personal income of £27,301 or more per year);
 - Those in managerial or professional (67%) or intermediate occupations (66%);
 - Those living outside London (63% compared with 50% of those living in London).
- To a large extent these patterns reflect general patterns of car use, for example, with higher levels of car use by those in the highest income groups, or in managerial occupations. However, the National Travel Survey indicates that young people make fewer car trips than older people, which suggests that young people in particular car-share for a higher proportion of their car trips.



Relation to driver

- Most car-share trips were given either by relatives (29%) or close friends (38%). A fifth (21%) said that they were given the lift by a work colleague.
- Men were more likely to receive a lift from a work colleague than women, while women were more likely to receive a lift from a relative. Similarly, work colleagues featured more often among those in managerial and professional groups and with higher incomes.

Driver destination

- In the majority (72%) of cases, the driver was going to the same destination as the respondent, meaning that for the remaining 28%, the driver was either going out of their way, or making an extra stop in order to provide the lift.

Contributions to the cost of the journey

- In around two-thirds (68%) of cases the passenger made some form of recompense for the lift, either by returning the favour (57%) and/or contributing to the cost (20%). Those who had undertaken journeys lasting more than half an hour were more likely to have directly contributed to the cost (35%).

3. What are the potential key social impacts of different climate change policy options?

- a) For each key potential social impact (bearing in mind Atkins' definition), we need to identify the policies that potentially have the (positive or negative) impact. Where impact is dependent on other factors (e.g. scope or stringency of policy, way in which investment is undertaken), these need to be identified clearly.
- b) Can any disproportionately negative affects be mitigated or positive ones be further maximized? If so, how?

Respondents who **had car shared as a passenger** in the last month were asked a series of questions about the most recent occasion to assess the nature of these arrangements and their importance to travel patterns.

Respondents were asked how often they made their most recent passenger car share journey and whether they also made the same journey by any other means.

- In two-fifths (42%) of cases the most recent car-share lift had been for a one-off journey or a journey that would occur less than once a month. However, in 28% of cases the lift took place at least once a week.
- A third (33%) said that they never made the journey in any other way, meaning that either the journey was a one-off or that a lift was their only means of making the journey. 28% of lift-sharers said that they made the journey by another way at least once a week.
- For those who did make the journey in another way, around half (47%) drove themselves, 29% used public transport and 24% made the journey on foot or cycled. It should be noted that on the occasion the respondent drove they may have given a lift to another person.
- 38% of those who had been given a lift in the last month said they usually received a lift for other journeys that they made regularly.

Car-share lifts covered a broad range of different journey purposes.

- The most frequently mentioned journeys were day trips or other entertainment/leisure trips (26%) and going to the shops or other services (24%). Other frequently mentioned journeys were visiting friends or relatives (16%), going home (15%) and commuting/travelling to work (14%).
- There was some variation in purpose across social groups, reflecting more general patterns in journey purposes.

- Overall, 25% of those who received a lift in the last month said that the journey was for the purpose of work/business or travelling from work/business, usually back home.
- Almost two-thirds (63%) of car-share trips were of 20 minutes or less in duration. A further 22% were up to 45 minutes in duration, while 15% exceeded 45 minutes.

4. How will these impacts (positive or negative) differ between social groups (distributional impacts)?

- a) Are there any disadvantaged groups or areas that may be negatively or positively affected? If so, how?
- b) Can any disproportionately negative affects be mitigated or positive ones be further maximized? If so, how?
- c) To what extent is the impact dependent on the area in which the different social group live?

No information on the impacts on different social groups or about variation in purpose across social groups, except that stated as an answer to question one.

5. How are public attitudes (including acceptability) likely to differ between social groups for both mandatory and voluntary options? How will take-up (and the barriers to take-up) of voluntary measures differ between groups?

Reasons for sharing a lift:

- The most common reason given for receiving a lift on the last occasion was because it was more convenient, mentioned by 63% of respondents.
- Around a quarter said that they had shared a lift because they could not drive themselves.
- 22% mentioned problems with public transport, either not wanting to use public transport, the time it would take, or lack of services available.
- Similarly, 22% mentioned cost-related factors, either to reduce the cost of car travel or because public transport was more expensive.
- 8% had done so because they wanted to reduce road congestion; 7% for environmental reasons.
- 2% mentioned that their employer provided an incentive to car-share.
- Older people and those in routine/manual occupations or with lower incomes were particularly likely to say they could not drive themselves or had no access to a car.

6. What will impact (in qualitative terms in absence of quantitative data) of policy options be on the i) transport behaviours, and ii) CO₂ emissions, of different groups?

No information on the impact on behaviours or CO₂.

7. What remaining gaps exist in the evidence base and how could these be filled?

One gap is lack of information on distributional impacts and on impact of car sharing on CO₂ emissions of different groups. Therefore research into these areas could be useful.

Social and Distributional Impacts of Transport Climate Change Policies

BASIC INFORMATION				
Author(s)	Litman, T		Year of publication	2009
Title/publication	Are Vehicle Travel Reduction Targets Justified? <i>Evaluating Mobility Management Policy Objectives Such As Targets To Reduce Vehicle Miles of Travel (VMT) And Increase Use Of Alternative Modes</i>			
Context	Type of publication e.g. journal article, other article, book, book chapter, working paper, report, conference paper, response to government consultation		Report	
	Type of study e.g. literature review, survey			
	Geographic – country, region, city			
	Sample size (if relevant)			

Synopsis of Document

1. What climate change policies are we concerned with?

This report investigates whether transportation policies should include targets to reduce vehicle travel and encourage use of alternative modes, called *mobility management objectives*. Such objectives are justified on several grounds: they help insure that individual short-term decisions support strategic goals, they provide numerous benefits, and they help prepare for future travel demands. Many mobility management strategies are market and planning reforms that increase transport system efficiency and equity. Mobility management criticism tends to reflect an older, automobile-oriented transportation planning paradigm which considers a limited range of objectives, impacts and options. More comprehensive analysis tends to favour mobility management. Appropriate mobility management can reduce vehicle travel in ways that minimize costs and maximize benefits to consumers and society.

2. What key groups will be impacted (positively or negatively) by different climate change policy options?
 - a) What is the likely impact of the policy measures that we have considered on people's travel behaviours?
 - b) Who and where will be most affected by these and how?

Even consumers who face negative incentives, such as higher fees or traffic calming, often benefit overall. For example, people who drive less due to higher road tolls, parking fees or fuel prices may be better off overall if revenues are used in ways that benefit them, for example, to improve their travel options or reduce other taxes. Even people who continue to drive may benefit overall if this reduces their congestion or accident risk, or reduces their need to chauffeur non-driving family members and friends (Litman 2007b).

Critics claim that mobility management harms poor people. This might be true if the only strategy is to increase road, parking and fuel prices, but lower-income people can benefit significantly from integrated programs that include improved travel options, particularly affordable modes such as walking, cycling, ridesharing and public transit; positive incentives such as parking unbundling and cash out, distance-based vehicle fees; flexitime and telework; and land use policies that create more accessible, multi-modal communities with affordable housing (VTPI 2008). Lower-income people often rely on alternative modes and so tend to benefit significantly from their improvement, and from better transportation and land use integration (such as more affordable housing and employment in areas easily accessed by walking, cycling and public transit).

3. What are the potential key social impacts of different climate change policy options?
 - a) For each key potential social impact (bearing in mind Atkins' definition), we need to identify the policies that potentially have the (positive or negative) impact. Where impact is dependent on other factors (e.g. scope or stringency of policy, way in which investment is undertaken), these need to be identified clearly.
 - b) Can any disproportionately negative affects be mitigated or positive ones be further maximized? If so, how?

Mobility management critics tend to ignore equity impacts. They assume that everybody (at least, everybody who matters) can use an automobile and so ignore the benefits of improving accessibility for non-drivers, and the disamenity that wider roads, increased traffic speeds and sprawled land use have on access by other modes.

Although decisions that stimulate mobility (such as low fuel prices and unpriced parking) may seem reasonable with modest individual impacts, their effects are cumulative and can be large in total: people who live or work in automobile-oriented areas typically drive 40-60% more annual miles and rely less on alternative modes than they would in more multi-modal communities (Pratt 1999-2009; Ewing, et al. 2007; VTPI 2008).

4. How will these impacts (positive or negative) differ between social groups (distributional impacts)?
 - a) Are there any disadvantaged groups or areas that may be negatively or positively affected? If so, how?
 - b) Can any disproportionately negative affects be mitigated or positive ones be further maximized? If so, how?
 - c) To what extent is the impact dependent on the area in which the different social group live?

No information given.

5. How are public attitudes (including acceptability) likely to differ between social groups for both mandatory and voluntary options? How will take-up (and the barriers to take-up) of voluntary measures differ between groups?

No information on attitudes to measures.

6. What will impact (in qualitative terms in absence of quantitative data) of policy options be on the i) transport behaviours, and ii) CO2 emissions, of different groups?

No information on behaviours or emissions.

7. What remaining gaps exist in the evidence base and how could these be filled?

No information given.

Social and Distributional Impacts of Transport Climate Change Policies

Author(s)	Aaron Golub and Jason Kelly	Year of publication	2010
Title/publication	Exploring potential inequities between the burdens and benefits of climate change abatement policies in the transportation sector		
Context			
	<i>Type of study e.g. literature review, survey</i>		
	<i>Geographic – country, region, city</i>		
	<i>Sample size (if relevant)</i>		

1. What climate change policies are we concerned with?
 - The promotion of alternative fuel vehicles
 - Pricing strategies such as road pricing
 - Fuel taxes, and user fees
 - The promotion of public transportation
 - Fuel efficiency improvement programmes
 - Improved transportation system efficiency

2. What are the potential key social impacts of different climate change policy options?
 - a) For each key potential social impact (bearing in mind Atkins' definition), we need to identify the policies that potentially have the (positive or negative) impact. Where impact is dependent on other factors (e.g. scope or stringency of policy, way in which investment is undertaken), these need to be identified clearly.
 - b) Can any disproportionately negative affects be mitigated or positive ones be further maximized? If so, how?

The key social impacts are affordability and accessibility for lower income groups.

3. How will these impacts (positive or negative) differ between different social groups (distributional impacts)?
 - a) Are there any disadvantaged groups or areas that may be particularly negatively or positively affected? If so, how?
 - b) Can any disproportionately negative
 - c) affects be mitigated or positive ones be further maximized? If so, how?
 - d) To what extent is the impact dependent on the area in which the different social group live?

The paper argues that the **benefits** of GHG abatement policies such as co-benefits (other simultaneous environmental goals such as local air quality improvements) and ancillary benefits (beneficial side-products of mitigation policies but not a specific goal) are unequally distributed. For example, strategies such as the construction of alternative fuel infrastructure and tax rebates for hybrid fuel vehicles tend to favour higher income groups that can afford these new technologies. Rail transit projects often primarily target "choice riders" by connecting wealthier residents with high-income jobs in an attempt to lure them out of their cars (Golub and Kelly page 6).

The paper points out that the **costs** of GHG abatement strategies are also unequally distributed. Golub and Kelley show (page 7) that various studies concluded that user fees are regressive as they place a greater burden on low-income groups if the revenues generated are not used for

infrastructure improvements geared toward low-income communities. If the revenue is used for this purpose, user fees are generally considered to be progressive (Golub and Kelly page 7).

4. What key groups and /or geographical areas will be most affected (positively or negatively) by these different social impacts?
 - a) What is the likely impact of the policy measures that we have considered on people's travel behaviours?
 - b) Who and where will be most affected by these and how?

Low-income groups.

Golub and Kelley produce a conceptual framework to assess the appropriateness of a climate change mitigation policy.

To assess the appropriateness of a potential climate change mitigation strategy, the three factors of **effectiveness, efficiency, and equity**, and the trade-offs between them are important to consider.

First, determining the effectiveness of a strategy involves an evaluation of its ability to achieve necessary GHG emissions reductions while also providing the desired levels of explicit co-benefits.

Second, determining the efficiency of a strategy requires looking not only at achieving stated desired benefits, but rather considers all costs (including social costs) and all benefits (including ancillary benefits) with the goal of maximizing the overall benefits to cost ratio.

Finally, unlike the considerations of effectiveness and efficiency, determining the equity of a strategy involves an analysis of all identified costs and benefits and the way in which they are distributed across society. This would include examining the vertical equity implications for the economically disadvantaged (including low income and minority groups) who are least responsible for but most vulnerable to the impacts of climate change. Trade-offs between the three factors of effectiveness, efficiency, and equity could arise.

5. How are public attitudes (including acceptability) likely to differ between social groups for both mandatory and voluntary options? How will take-up (and the barriers to take-up) of voluntary measures differ between groups?

Not covered by this report.

6. What will impact (in qualitative terms in absence of quantitative data) of policy options be on the i) transport behaviours, and ii) CO2 emissions, of different groups?

Not covered by this report.

7. What remaining gaps exist in the evidence base and how could these be filled?

Not covered by this report.

Author(s)	Lucas K. and Jones, P.	Year of publication	2009
Title/publication	<i>The Car in British Society</i> RAC Foundation		
Context			
	<i>Type of study e.g. literature review, survey</i>		
	<i>Geographic – country, region, city</i>		
	<i>Sample size (if relevant)</i>		

1. What climate change policies are we concerned with?

One part of the report looks specifically at the effects of increased fuel prices, place-based charging and Personal Carbon Budgets. People in five focus groups discussed their likely responses to these measures as well as their attitudes towards them and the impacts on their lifestyles. The groups involved 8-10 participants from the following categories:

- Older drivers 75 years plus
- New drivers 18-25 years
- Banned drivers (alcohol or speed related)
- Voluntary mode switchers (from car to bus)
- Non-car owning households

The groups were selected on the basis that they would offer some useful insights into the attitudes of people who had recently experienced, or were about to experience, a significant change in their travel circumstances. Although the groups were not intentionally made up of low income participants some of the group participants were clearly living on quite low incomes, particularly in the new and banned drivers groups. Whilst not representative of the population at large, some useful insights were offered on the reactions of these different social groups to the three car reduction measures.

The report also included analysis of changing travel trends between 1986 and 2006 using data taken from the NTS broken down by income, gender, age and levels of household car ownership, but for the purposes of this study this is better covered in Bayliss (2009). There is also a section on driver attitudes to transport using data from the Lex/RAC Motoring Survey but this is not disaggregated by income or social grouping and so is of little value to this study.

2. What are the potential key social impacts of different climate change policy options?

- a) For each key potential social impact (bearing in mind Atkins' definition), we need to identify the policies that potentially have the (positive or negative) impact. Where impact is dependent on other factors (e.g. scope or stringency of policy, way in which investment is undertaken), these need to be identified clearly.
- b) Can any disproportionately negative affects be mitigated or positive ones be further maximized? If so, how?

These were mostly seen to be negative in terms of an increased economic cost on households. Some benefits were identified from increased physical activity (from increased walking), reduced local traffic levels and more opportunities to socialise on public transport for a minority. Most participants said that they had already reduced their travel as a result of increased costs and some older participants had already given up a second car. The voluntary switchers were amenable to using more public transport but the banned drivers were very public transport adverse, suggesting that voluntary means of changing travel behaviour are more acceptable than enforced ones.

3. How will these impacts (positive or negative) differ between different social groups (distributional impacts)?
 - a) Are there any disadvantaged groups or areas that may be particularly negatively or positively affected? If so, how?
 - b) Can any disproportionately negative affects be mitigated or positive ones be further maximized? If so, how?
 - c) To what extent is the impact dependent on the area in which the different social group live?

The groups were not recruited in the basis of income but rather their car use, so this was not covered. It was clear, however, that there were big differences between the attitudes of people living on the outskirts of Nottingham city centre where public transport was seen to be available and regular even at night to those on the Banbury groups who felt their public transport options to be poor, if not non-existent. This is an interesting regional variation which is likely to be repeated across the UK given the highly variable levels of public transport in similar types of settlements and in different parts of the country.

4. What key groups and /or geographical areas will be most affected (positively or negatively) by these different social impacts?
 - a) What is the likely impact of the policy measures that we have considered on people's travel behaviours?
 - b) Who and where will be most affected by these and how?

Very old people (over 80 years) living in rural areas were identified as particularly negatively affected because basic local facilities such as shops and GPs were often missing from these areas and they either also had no public transport available or could not use what was available for reasons of infirmity. Lone parents with no car in rural areas were also seen to be very disadvantaged in that they mostly had to rely on friends and families for lifts if they wanted to go anywhere.

5. How are public attitudes (including acceptability) likely to differ between social groups for both mandatory and voluntary options? How will take-up (and the barriers to take-up) of voluntary measures differ between groups?

Attitudes were fairly similar across all the groups in that the area-based pricing options were seen as the least favourable and the PCA the most equitable way forward. Surprisingly, however, most people felt that increased fuel costs were also quite fair because those who travel the most pay the most. This can be qualified in that they believed that everyone should have a certain tax free allowance for fuel first and then pay larger amounts of tax on any travelling they undertook over and above this allowance.

6. What will impact (in qualitative terms in absence of quantitative data) of policy options be on the i) transport behaviours, and ii) CO2 emissions, of different groups?

People said they would first reduce their leisure and incidental trips by car sharing within households and trip chaining more. A few people said that they would be happy to give up their cars and a few more that they would be forced to so if the cost of motoring increased again. Some would use public transport more where this was available but many preferred to walk instead for the health benefits and cost savings this would bring. A few people had considered moving the location of their job. Older people felt that they if they had to stop driving they would become cut off from their friends and families and lose their independence. Many were driving into their 80s and even 90s

7. What remaining gaps exist in the evidence base and how could these be filled?

No specific groups were held with low income car drivers (see Smith, 2009 for evidence on this).

Social and Distributional Impacts of Transport Climate Change Policies

Author(s)	ODPM	Year of publication	2005
Title/publication	Tackling Social Inclusion through New Technologies		
Context			
	<i>Type of study e.g. literature review, survey</i>		
	<i>Geographic – country, region, city</i>		
	<i>Sample size (if relevant)</i>		

1. What climate change policies are we concerned with?

The report deals with the use of Information and Communication Technologies (ICT) in tackling social exclusion.

2. What are the potential key social impacts of different climate change policy options?

- a) For each key potential social impact (bearing in mind Atkins' definition), we need to identify the policies that potentially have the (positive or negative) impact. Where impact is dependent on other factors (e.g. scope or stringency of policy, way in which investment is undertaken), these need to be identified clearly.
- b) Can any disproportionately negative affects be mitigated or positive ones be further maximized? If so, how?

The social impacts are exclusively positive. The document explains that ICT can reduce the need to travel, which improves social inclusion in a number of ways:

- Improving access to employment via home working, flexible working arrangements, better engagement in the workforce of disabled people and a range of new jobs (page 12).
- Improving access to services, for example via e-government.
- Building social networks and civic participation: The opportunities for communication with friends, family, or new communities of people who share interests is one of the most striking and liberating aspects of ICT (page13).

3. How will these impacts (positive or negative) differ between different social groups (distributional impacts)?

- a) Are there any disadvantaged groups or areas that may be particularly negatively or positively affected? If so, how?
- b) Can any disproportionately negative affects be mitigated or positive ones be further maximized? If so, how?
- c) To what extent is the impact dependent on the area in which the different social group live?

Further maximization of positive effects would mean reducing barriers to ICT.

The report identifies four key barriers to using ICT (p19):

1. Preliminary needs that people felt would have to be addressed before they could consider accessing and using ICT such as housing, language and literacy skills.
 2. Perceived cost such as ICT equipment or the cost of using computer terminals. People living in households in the highest income group are seven times more likely to have home access to the Internet than those in the lowest group (page 20).
 3. Barriers with regard to where respondents could access computers and the Internet outside the home. Lack of awareness of available resources, providers closing down in rural locations and overly restrictive time limits placed on use were all issues associated with this barrier.
 4. A lack of relevant content. Evaluation of UK online centre users has confirmed that by far the biggest barrier to accessing the Internet is lack of interest and motivation, closely linked to a lack of perceived need (page 21).
4. What key groups and /or geographical areas will be most affected (positively or negatively) by these different social impacts?
- a) What is the likely impact of the policy measures that we have considered on people's travel behaviours?
 - b) Who and where will be most affected by these and how?

The report specifically mentions older and disabled people who have problems travelling, and mothers with young children, including those who live on deprived estates (page 4) as key groups that would be positively affected.

Socially excluded groups in rural areas would be most affected as they generally experience more problems accessing services and employment.

5. How are public attitudes (including acceptability) likely to differ between social groups for both mandatory and voluntary options? How will take-up (and the barriers to take-up) of voluntary measures differ between groups?

Take –up is one of the main barriers (see above) as a significant proportion of excluded people do not see the need to use the internet. A number of reports concur on the general shortage of content to motivate disadvantaged groups to use the Internet (Page 21)

It is clear that while socially excluded groups face significant barriers to accessing and using certain types of ICT such as PCs and the Internet, they more readily access and use others, notably mobile phones. There is a danger that as central and local government increasingly make their services available online, this will be to the detriment of those who are unable to or do not wish to access the Internet (page 47).

The report does not state which excluded groups are reluctant to take- up ICT.

6. What will impact (in qualitative terms in absence of quantitative data) of policy options be on the i) transport behaviours, and ii) CO2 emissions, of different groups?

Not covered by this report

7. What remaining gaps exist in the evidence base and how could these be filled?

The report mentions more behavioural research focused on making content more attractive to excluded individuals is needed (page 47).

Social and Distributional Impacts of Transport Climate Change Policies

BASIC INFORMATION				
Author(s)	Gordon Mitchell		Year of publication	2005
Title/publication	Forecasting environmental equity: Air quality responses to road user charging in Leeds, UK			
Context	Type of publication e.g. journal article, other article, book, book chapter, working paper, report, conference paper, response to government consultation	Journal article		
	Type of study e.g. literature review, survey	Literature review and modelling results		
	Geographic – country, region, city			
	Sample size (if relevant)			

Synopsis of Document

This paper investigates the relationship between urban air quality (as NO₂) and social deprivation for the city of Leeds, UK. Through application of a series of linked dynamic models of traffic simulation and assignment, vehicle emission, and pollutant dispersion, the environmental equity implications of a series of urban transport strategies, including road user cordon and distance-based charging, road network development, and emission control are assessed. Results indicate a significant degree of environmental inequity exists in Leeds. Analysis of the transport strategies indicates that this inequity will be reduced through natural fleet renewal, and, perhaps contrary to expectations, road user charging is also capable of promoting environmental equity. The environmental equity response is, however, sensitive to road pricing scheme design.

1. What key groups will be impacted (positively or negatively) by different climate change policy options?
 - a) What is the likely impact of the policy measures that we have considered on people's travel behaviours?
 - b) Who and where will be most affected by these and how?

The document describes 'Environmental Justice' but little description about effect upon different groups.

2. What are the potential key social impacts of different climate change policy options?
 - a) For each key potential social impact (bearing in mind Atkins' definition), we need to identify the policies that potentially have the (positive or negative) impact. Where impact is dependent on other factors (e.g. scope or stringency of policy, way in which investment is undertaken), these need to be identified clearly.
 - b) Can any disproportionately negative affects be mitigated or positive ones be further maximized? If so, how?

Only discusses the impact of RUC on nitrogen dioxide (NO₂) emissions.

Table 6
Tests of difference in Leeds NO₂ (%change by scenario) in the upper and lower quartiles of the Townsend index

Scenarios compared	Change in annual mean NO ₂ (%)		Two-tailed T-Statistic ^a
	Lower Townsend quartile ^b	Upper Townsend quartile ^b	
<i>Do nothing</i>			
1993–05	–30.01	–36.37	15.40*
2005–15	–11.05	–15.49	17.08*
1993–2015	–37.51	–46.02	16.26*
<i>Road network development</i>			
Do-all	+0.18	+0.34	3.33**
<i>Road user charging</i>			
Single cordon (£3)	–0.57	–0.89	3.61**
Double cordon (£1 +£2)	–3.18	–4.26	8.67*
2 p/km distance charge	–2.67	–4.10	13.22*
10 p/km distance charge	–8.50	–15.54	18.38*
20 p/km distance charge	–10.46	–19.26	18.60*
Single–double cordon	–2.62	–3.39	6.18*
Double cordon—2 p/km	–0.51	–0.15	–2.66***

^a There are 463 degrees of freedom, and * $P < 0.0001$; ** $P < 0.001$; *** $P < 0.01$.

^b Quartile mean Townsend scores as Table 5.

3. How will these impacts (positive or negative) differ between social groups (distributional impacts)?
 - a) Are there any disadvantaged groups or areas that may be negatively or positively affected? If so, how?
 - b) Can any disproportionately negative affects be mitigated or positive ones be further maximized? If so, how?
 - c) To what extent is the impact dependent on the area in which the different social group live?

Road user charging may be more effective than low emission zones (LEZs) in addressing environmental inequity. LEZs are an air quality management tool, currently being considered by UK local governments, in which particular classes of vehicle are barred from an area.

Perhaps contrary to expectations, road user charging is capable of promoting environmental equity. This should be welcome news to local governments in the UK, who now have legal powers to implement road user charging to control congestion and pollution, but who have expressed concerns about the impact that schemes may have on the redistribution of traffic and pollution (DETR, 1998b). Nevertheless, detailed design issues still require careful assessment for each city where a charge is considered.

4. What key groups and /or geographical areas will be most affected (positively or negatively) by these different social impacts?
 - a) What is the likely impact of the policy measures that we have considered on people’s travel behaviours?
 - b) Who and where will be most affected by these and how?

5. How are public attitudes (including acceptability) likely to differ between social groups for both mandatory and voluntary options? How will take-up (and the barriers to take-up) of voluntary measures differ between groups?

The importance of public participation is recognised in EPA guidance (The US Environmental Protection Agency) on Environmental Justice assessment, including measures that require assessment under the Clean Air Act (EPA, 1998, 1999). The guidance addresses issues of community involvement in scoping (e.g. identifying target groups and preferred mitigation measures), and in reviewing the EJ assessment. By extending public involvement to the other key issues (more pollutant variables (especially

PM10, a significant current health concern); alternative outcome measures (e.g. health impact); and other target groups (e.g. ethnic minorities, transport system users and non-users), more robust assessments would result. However, from their survey of environmental concerns in disadvantaged communities, Burningham and Thrush (2001) found that air quality was not a major concern despite the fact that asthma sufferers who were not car owners recognised a connection between traffic, air pollution and their ill health. This lack of concern was attributed to respondents' perception that air quality was inextricably linked to continual traffic growth, which they perceived as an intractable problem. This study, therefore, suggests that encouraging key groups to participate in environmental equity and justice evaluations may be difficult.

6. What will impact (in qualitative terms in absence of quantitative data) of policy options be on the i) transport behaviours, and ii) CO2 emissions, of different groups?

As noted under question 2, the analysis reported here is based upon NO2 concentration as the environmental variable. NO2 was selected as the study pollutant, as NAQS studies have indicated that NO2 and PM10 are the principal pollutants of concern in UK urban areas, and are thought to pose significant risks to health. In addition, NO2 in Leeds is more sensitive to changes in transport emissions than PM10, due to a large point source contribution to total particulate emission. The NO2 24-h annual mean value is used in preference to the percentile value, as this parameter is recommended by COMEAP, the UK committee of medical experts on air pollution, for use in respiratory disease burden estimation (DoH, 1998).

The analysis shows that there is social inequity in the distribution of NO2 in Leeds, with deprived areas experiencing significantly higher atmospheric concentrations than communities of average or above average affluence.

Transport scenario	R ²	F stat.	Intercept	Slope	Slope 95% confidence interval
<i>Do nothing</i>					
1993	0.16	341.9*	29.57	0.8205	0.734-0.908
2005	0.17	387.4*	19.48	0.2846	0.256-0.313
2015	0.14	293.3*	16.89	0.1224	0.108-0.136
<i>Network development</i>					
Do all (2005)	0.17	380.2*	19.53	0.2903	0.261-0.319
Do all (2015)	0.18	409.5*	18.32	0.2234	0.202-0.245
<i>Road user charging</i>					
No charge	0.19	420.3*	19.79	0.3599	0.352-0.394
Single cordon (£3)	0.18	412.3*	19.65	0.3453	0.312-0.379
Double cordon (£1 + £2)	0.18	408.7*	19.02	0.3162	0.286-0.348
2 p/km distance charge	0.18	396.3*	19.11	0.3067	0.276-0.337
10 p/km distance charge	0.11	218.0*	17.36	0.1065	0.092-0.128
20 p/km distance charge	0.03	60.7*	16.81	0.0415	0.031-0.052

All scenarios are for 2005 unless otherwise stated. *P<0.0001.

Air quality in Leeds, UK was assessed under a range of strategic road transport options of interest to local and central government. The options investigated were: (1) do nothing, assessed for the

years 1993, 2005 and 2015; (2) road user charging under a single inner cordon with a £3 toll; (3) road user charging under a double cordon, with a £1 outer cordon charge and a £2 inner cordon charge, giving the same £3 toll to enter the city centre as the single cordon; (4) road user charging under distance-based charges of 2, 10 and 20 p/km travelled within the zone outlined by the outer cordon; (5) network development, including 7 km of urban dual carriageway intended to ease city centre traffic congestion and provide access to a new economic development zone; and (6) promotion of clean fuelled vehicles to 2015.

The analysis also shows that environmental inequity in Leeds is reduced by all but one of the strategic transport options (Table 3 above) investigated. Under a do-nothing strategy, inequity between the most affluent and deprived communities (upper and lower quartiles) declines from 10.6 in 1993 to 3.7 mg/m³ in 2005 and just 2.8 mg/m³ in 2015. These reductions occur as a result of city-wide improvements in air quality, driven by fleet renewal (e.g. more efficient and prevalent emission control technology) that outweighs the effect of forecast growth in total road trips, and acts to lower total NO_x emission from the vehicle fleet.

Road user charging also reduces inequity in exposure to NO₂, with the extent of the reduction varying according to the charge option.

7. What remaining gaps exist in the evidence base and how could these be filled?

Gaps as identified in the report:

Methods of environmental equity and justice analysis are generally poorly developed, but are evolving. The inclusion of environmental equity assessment into the planning process should lead to the promotion of social justice and a greater balance between the three meta-goals of sustainable development (economic development, environmental protection and social justice).

There are clearly several key issues to be addressed if EJ is to be effectively addressed in the planning process. These include: defining appropriate procedures and analytical methods of environmental equity assessment; predicting how equity changes over time, and in response to policies and plans; and how to interpret inequities within a justice framework (including causality and 'what is fair' issues). There is also the wider challenge of balancing justice concerns against economic development and environmental protection goals.

Social and Distributional Impacts of Transport Climate Change Policies

PART A – BASIC INFORMATION				
Author(s)	Fiona Raje		Year of publication	2003
Title/publication	The impact of transport on social exclusion processes with specific emphasis on road user charging			
Context	Type of publication e.g. journal article, other article, book, book chapter, working paper, report, conference paper, response to government consultation	Journal article		
	Type of study e.g. literature review, survey	Literature review and summary of focus group research		
	Geographic – country, region, city	Bristol		
	Sample size (if relevant)	105 people		

Synopsis of Document

This paper looks at the ways in which transport can impact on social exclusion processes by examining how the introduction of road user charging may affect residents of Bristol. It gives an overview of the concept of transport and social inclusion/exclusion, describes key themes emerging from DfT-funded research conducted in the city and reflects on the importance of consideration of these themes to the policy's successful implementation. By exploring road user charging from both collective and individual perspectives, the paper illustrates how this congestion charging policy could promote social inclusion.

1. What climate change policies are we concerned with?

Road user charging

2. What key groups will be impacted (positively or negatively) by different climate change policy options?

- a) What is the likely impact of the policy measures that we have considered on people's travel behaviours?
- b) Who and where will be most affected by these and how?

More details within the answers to questions 2 and 3, but the article mainly covers:

- a. Inner city residents
- b. Elderly
- c. Ethnic minorities
- d. Women
- e. Those on low incomes

3. What are the potential key social impacts of different climate change policy options?

- a) For each key potential social impact (bearing in mind Atkins' definition), we need to identify the policies that potentially have the (positive or negative) impact. Where impact is dependent on other factors (e.g. scope or stringency of policy, way in which investment is undertaken), these need to be identified clearly.
- b) Can any disproportionately negative affects be mitigated or positive ones be further maximized? If so, how?

There is a potential in road user charging for development of boundary problems and displacement effects.

Bristol Case Study – Boundary Problems:

The inner city areas of St Paul's (Ashley ward) and Easton to the east of the city centre, with the city's highest concentration of ethnic minority population, already experience spill over parking from the centre with drivers leaving their cars on local streets and walking or taking the bus into town. Focus group members from these areas envisaged an intensification of this behaviour if road user charging was introduced.

If a cordon charge is introduced in the city centre, one can assume that drivers will search in areas immediately outside of the cordon for parking, with St Paul's being the obvious destination, particularly since the M32 brings inbound traffic to this part of the city. One could therefore assume that the charge's introduction could result in a 2-fold and linked displacement effect—the displacement of cars that would have been parked in the city centre to the St Paul's area and the consequent displacement of residents' opportunities to park in their local area from St Paul's to adjacent areas. This latter effect would be particularly pronounced during the morning school run period, when mothers may take their children to school in St Paul's, and as is characteristic of trip-chaining, then run an errand before returning home to find nowhere to park.

Taking the scenario further, if commuters are parking in Easton and St Paul's and then travelling into town, some are likely to use buses to access the city centre. Local residents of these two areas already describe being unable to board buses that are full by the time they arrive at their boarding point and this difficulty could be heightened, especially for those living on streets in close proximity to the city centre and nearing the end of the bus route. The resultant inaccessibility of bus services because of high loadings would be particularly detrimental to ethnic minorities, the young and the elderly who may not have an alternative but to wait for another bus with the likelihood that it will also be full. For others, the inability to use the bus may mean they have to resort to using taxis for essential journeys, biting into limited household budgets and evoking serious equity issues. These findings highlight the importance of hypothecation of the revenue generated by road user charging to improve local bus services.

Some possible solutions to these displacement effects are using traffic warden real-time enforcement data to determine which drivers are committing parking offences in the St Paul's and Easton areas and ensuring adequate enforcement is complemented by strict residents' parking zones, provision of a park and ride facility east of the area to divert commuters from parking on local streets or incentives for car-sharing that allow access to city centre for multiple occupancy vehicles at lower charge rates.

Bristol Case Study – Public Transport:

Participants generally perceive that there are personal security and safety issues in using the public transport system, ranging from prostitutes plying their trade at local bus stops, exposure to bad weather at bus stops, gangs of intimidating youths on board buses, fear when walking through the city centre at night for interchange, to a feeling that drivers are unapproachable. This baseline concern needs to be addressed when road user charging is introduced, otherwise those who feel threatened using public transport, in particular women, young people, the elderly and ethnic minorities, may stop making journeys as car-based travel becomes harder to access economically, whether it be by taxi, as a car driver or car passenger.

Public transport is seen as expensive, often inaccessible and insecure and is characterized by lengthening journey times and inconvenient routeings. The result of this perception is that people do not travel by bus, if possible; if they do, they find the experience unpleasant and sometimes forfeit journeys.

To lessen this car dependency, public transport that is easy to use with through ticketing, passes and information readily available appears to be overdue. Without investment in public transport, reliance on car based journeys will continue after inception of cordon charging with consequent impacts on household budgets of those who are most financially vulnerable.

Bristol Case Study – Suppression of Journeys:

A rise in the price of car use resulting in a change of mode away from car could present major problems for older members of ethnic groups, particularly women, who have little information on how to use public transport and experience linguistic barriers. Amongst some groups, notably the Asian elderly, the car has often been the dominant mode of travel. As they age, some people find that they no longer have access to the car—the driver may die leaving a non-driving spouse, physical problems may prevent driving and economic costs may render driving unfeasible.

The introduction of a charge which could result in an enforced change of mode from car to bus needs to be complemented by efforts to address these latent prerequisites if this group of people are to be able to continue to make certain journeys. It should be noted that the public are not necessarily calling for huge financial outlay, for example, the provision of training on bus use for the elderly through existing social clubs and meeting places or supply of information in other languages at key dissemination points such as local ethnic food shops does not involve huge expense.

Without hypothecated revenue being channelled towards alternative modes such as cycling, walking and public transport, private car/taxi travel may continue to be the only option for people such as some of the participants from ethnic minority groups, the young and the elderly who find public transport intimidating.

Indeed, without a viable alternative, some people on low incomes and needing to travel for shift-working may be forced to run a car (Jones, 2001). In terms of essential journeys, participants who rely on others for lifts to destinations such as doctor's appointments, work and food shops reported that they would not be able to justify the expense that the driver would incur if a charge was in operation.

For those who are only just able economically to continue running a car at present (which they need because of family circumstances such as a disabled family member, cumbersome trip-chaining by public transport, shift-working) the introduction of a charge may be the factor that renders them unable to afford the car anymore, if their trips are to or through the central area on weekday mornings. All the journeys that had been facilitated by the 'forced' car could thus be forfeited, particularly in the context of a public transport system that is perceived to be deficient in satisfying basic travel needs.

Bristol Case Study – Accessibility

The gap between public and professional perceptions of accessibility needs to be addressed—there must be equity in respect of mobility and equity in respect of accessibility for public acceptance of transport policies. The disguising of poor accessibility hides the real experience of difficulties accessing key services, which can in turn affect public acceptability—in the context of this study, this could interfere with the adoption and implementation of road user charging.

4. How will these impacts (positive or negative) differ between social groups (distributional impacts)?
 - a) Are there any disadvantaged groups or areas that may be negatively or positively affected? If so, how?

- b) Can any disproportionately negative affects be mitigated or positive ones be further maximized? If so, how?
- c) To what extent is the impact dependent on the area in which the different social group live?

Metz (2002) has stated that 'Introducing congestion charging on a scale sufficient to improve efficiency substantially would result in a big move away from equity' but fails to consider the impact of hypothecation. While on the surface, his statement appears to substantiate the participants' views of what would happen after introduction of road user charging, one has to look at the baseline situation in Bristol to determine whether what he has said indeed holds true there. In order to 'move away from equity' there must be fundamental transport equity which is not evident in the city. Instead, there is a perception of 'unfairness' in the current transport situation in Bristol to which road user charging could have the potential to contribute further. However, contrary to Metz's view, the empirical findings suggest that effective investment of revenues from charging could do much to restore equity by transferring money from the car driving sector to the more vulnerable groups who may have to rely heavily on other modes.

Taking this further, Metz has characterized transport at present as 'a relatively egalitarian domain'. The baseline evidence provided by focus group members in Bristol does not reflect the equity he perceives: low income people describe dependence on taxis for essential journeys, women and young people report using the buses in fear or choosing not to make the journey, radial routes and mandatory interchange mean high fares and time costs, and Dial-a-Ride is seen as inflexible. These conditions result in poor access to the range of services that the individuals involved in this research expect for full social participation.

Investment of road user charging revenue in improvements to public and demand responsive transport would facilitate better access to services and encourage the desired levels of participation. The people taking part in this research have made it clear, however, that improvement in their experience of transport is largely needed on the lower end of the investment scale.

Hypothecation allows deployment of revenue to resolve existing transport inequity. In this regard, this research indicates that a major area that should be addressed is the reorganization of public transport services to allow journeys to be made along social links such as between ethnic minority communities of St Paul's and Easton.

For the elderly, infirm and disabled there must be flexibility in demand responsive services to enable journeys to be made easily. Without this flexibility at present, characterized by very short periods in which bookings can be made, the need to book two days in advance of a journey and the limitation to travel only during day time, several participants report that they are having to forego trips or use alternative resources such as relatives and friends for lifts or pay for taxis. Hypothecated revenue applied to improvements in such services to make them truly demand responsive, perhaps through investment in online scheduling and booking software and provision of taxi vouchers/ services to supplement existing mini-bus based service, would contribute towards social equity and have an additional benefit of decreasing the number of private car trips that are being used as substitutes when demand responsive transport failure is experienced.

- 5. How are public attitudes (including acceptability) likely to differ between social groups for both mandatory and voluntary options? How will take-up (and the barriers to take-up) of voluntary measures differ between groups?

Public acceptability requires that residents feel that they are involved in the process of policy-making and introduction. Given that there will be impacts of road user charging on all Bristol residents to some degree, public involvement in the policy's evolution is desirable. A campaign that includes mechanisms for involving everyone in a decision that affects them in their communities can

make a major contribution to the policy's outcome as the decision-making structure appears more inclusive and democratic.

Consistent with other research many respondents stressed the acceptability of RUC was dependent on the use of the revenue for improving existing public transport provision and amelioration of prevailing difficulties.

6. What will impact (in qualitative terms in absence of quantitative data) of policy options be on the i) transport behaviours, and ii) CO2 emissions, of different groups?

No information.

7. What remaining gaps exist in the evidence base and how could these be filled?

Gaps as identified in the report:

The focus group evidence indicates that there is a clear need for local authorities to consider the wider impacts of proposed congestion charging schemes on different social groups. An equity audit would facilitate the examination of the key issues that need to be addressed in introducing such a scheme. It is recommended that this should consist of a checklist that should be carried out at various stages in the scheme's lifecycle: preliminary design, detailed design, preopening, 6–12 months after inception and, consequently, at periodic 1–5 yearly intervals. The checklist would need to be adjusted to reflect changes in circumstances over time. The audit should take account of all groups in society (such as those defined by the following factors: gender, ethnicity, age, disability, unemployment, low-income).

In the case of Bristol, for example, following on from the St Paul's displacement parking effect, traffic wardens could be used to feed back real-time online information on parking violations resulting out of the introduction of the cordon. This is a potential instrument for Bristol City Council to consider in the conducting of an equity audit.

It is recommended that an audit of equity (Grieco, 2002) should be carried out to explore their true levels of access to services and to quantify accessibility by ethnicity, gender, income and lifecycle experience. This would assist not only in acquiring a baseline understanding of accessibility but also in measuring how road user charging affects these social groups and in determining how revenue obtained may be applied to close the gap between the public and professional perceptions of accessibility.

It would be beneficial to develop a greater understanding of the way relational resources interact in transport. The reliance on social networks was evident in the research but an insight into the way inter-household co-ordination is managed would be particularly helpful to local authorities auditing equity in relation to charging policies.

Additional thoughts: Research into impact of climate change policy options on behaviour/CO2 emissions?

Social and Distributional Impacts of Transport Climate Change Policies

PART A – BASIC INFORMATION			
Author(s)	Peter Bonsall and Charlotte Kelly		Year of publication 2005
Title/publication	Road user charging and social exclusion: The impact of congestion charges on at-risk groups		
Context	Type of publication e.g. journal article, other article, book, book chapter, working paper, report, conference paper, response to government consultation	Journal article	
	Type of study e.g. literature review, survey	Literature review and investigation of a synthetic population (charging in Leeds)	
	Geographic – country, region, city	Case study of Leeds	
	Sample size (if relevant)		

Synopsis of Document

The importance of social exclusion in the context of congestion charging is discussed, and the groups most particularly at-risk identified. A new technique, Popgen-T, based on generation and investigation of a synthetic population is introduced and used to establish the impacts on at-risk groups of six congestion charging schemes in Leeds. The distribution and severity of impacts are seen to depend crucially on the precise definition of the charge area, the basis of the charges and exemptions provided. Using the new technique, it can be seen how the impact on at-risk groups could be minimized without compromising the overall objectives of congestion charging. Further potential applications of the new technique are outlined.

1. What climate change policies are we concerned with?

Road user charging

2. What key groups will be impacted (positively or negatively) by different climate change policy options?

- a) What is the likely impact of the policy measures that we have considered on people's travel behaviours?
- b) Who and where will be most affected by these and how?

If road user charging is introduced some drivers will reduce their car use due to the charge and others will have to make economies elsewhere. Either eventuality could have serious consequences for some people and could make it difficult for them to continue to participate in society.

It is often suggested that, since car owners are generally more affluent than non-car owners, and since road charges will be imposed only on car users, the main effect of road charging will be to remove income from the more affluent members of society and to re-distribute it, via public spending, to the less affluent. This view of road charging as a tax on those most able to pay is something of an oversimplification! Not all car owners are affluent. Recent evidence (DfT, 2002) indicates that 38% of households in the lowest quintile income group have access to a car (an increase from 26% in 1985/1986).

In a perfectly free market, **drivers** faced with a new charge would have the option of paying it or making alternative arrangements. It is suggested that those with high values of time will be happy to pay the charge because it would buy them access to less congested roads, while those with low

values of time will make alternative arrangements. Richer people, the argument runs, will have higher values of time and so will pay the charge while poorer people with lower values of time will seek to travel less frequently or at other times, by other modes, and to other destinations. So far so good, but many of those for whom the charge would be an imposition may not be able to make alternative arrangements without compromising their participation in society.

For those drivers who have no viable alternative to use of the car, road user charging will increase social exclusion if their participation in society is compromised either because they have to stop using their cars or because they have to make economies elsewhere.

The literature (e.g. Raje´ et al., 2004a,b) identifies a number of groups who are potentially at-risk from the introduction of road charges. The main one will be those **low-income drivers** who either have to stop travelling, so lowering their mobility levels, or have to pay the charge (if they have no alternative) so putting an extra strain on their already limited resources. Whilst a low-income would leave people particularly vulnerable to the introduction of road charges it is clear that the presence of other factors could change a mild inconvenience into a major problem. Difficulty or inability to use public transport would make a driver particularly vulnerable to the introduction of road charges. Thus, one might regard the following drivers as being particularly at-risk: those suffering from disabilities (access problems), elderly people (access problems and security fears), females (potential security fears), ethnic minority groups (potential security fears and inability to understand how to use public transport) and, of course, those whose trip is not served by public transport.

The paper goes into detail about different types of theoretical charges within Leeds and highlights the impact on at-risk groups differs depending on the location and extent of the charge area and the basis of the charge. Different schemes require different charges to maintain the same revenue and the charges which result can have very different effects. The various at-risk groups are affected to different extents by each of the policies tested and the financial implications of providing exemptions are markedly different— as is the efficiency with which exemptions can be targeted at the most vulnerable groups.

3. What are the potential key social impacts of different climate change policy options?

- a) For each key potential social impact (bearing in mind Atkins' definition), we need to identify the policies that potentially have the (positive or negative) impact. Where impact is dependent on other factors (e.g. scope or stringency of policy, way in which investment is undertaken), these need to be identified clearly.
- b) Can any disproportionately negative affects be mitigated or positive ones be further maximized? If so, how?

In addition to what might be termed the first-order effects of road charging there are a number of impacts which come about in consequence of people's responses to the charges. The second-order effects include problems caused by diversion onto roads just outside the charge areas or parking outside the charge area to avoid paying the charge and changing to another mode. Third-order effects might include land-use changes stimulated by changed travel patterns— for example the closure of some shops within the charge zone. The second- and third-order effects could impact on social exclusion if they disadvantage at-risk groups—for example if rat-running traffic or out-of-zone parking causes environmental degradation in low-income neighbourhoods, if public transport becomes so crowded with people from distant suburbs that those who wish to board in the inner suburbs find it impossible to do so, or if the city centre shops accessible to non-car owners are replaced by others in out-of-town retail parks.

4. How will these impacts (positive or negative) differ between social groups (distributional impacts)?

- a) Are there any disadvantaged groups or areas that may be negatively or positively affected? If so, how?
- b) Can any disproportionately negative affects be mitigated or positive ones be further maximized? If so, how?
- c) To what extent is the impact dependent on the area in which the different social group live?

The impact of road user charging on at-risk groups may differ depending on the arrangements adopted for paying the charges, for example, if charges have to be paid as a lump sum in advance this could be problematic for people on low incomes. Similarly, if lack of access to a bank account or credit facilities makes the process of paying more onerous this could disadvantage those at the fringes of society. The choice of technology used to collect the charges, be it smartcards, beacons or GPS could also be problematic for low income drivers if they are expected to pay to have their vehicles equipped.

One of the simplest ways of protecting at-risk groups may be to provide exemptions for them—although this would reduce the effectiveness and profitability of the scheme and might not be an effective way of targeting the relief. The London congestion charging scheme includes exemptions or discounts for licensed taxis; disabled drivers with Blue Badges; residents (90% discount); certain NHS staff and certain NHS patients; buses, coaches, two wheeled vehicles and alternative-fuelled vehicles; and vehicles used by the emergency services, the armed forces or breakdown organizations (for a comprehensive list see TfL, 2005). A number of other groups, including low-paid workers who travel at unsocial hours (e.g. cleaners, market porters, theatre staff) and emergency service staff who live outside the charge area, argued that they should also be exempt from the charge (e.g. Unison, 2003). In fact, it was decided that these workers would not be exempt—it being argued that their employers ought to be prepared to pay the charge. Clearly, the choice of groups to receive an exemption or discount is a political matter.

As an alternative to the provision of exemptions for at risk groups, a more positive option might be to ensure that alternative modes are available. Cycling and walking might be relevant in some circumstances and improvement of facilities for cyclists and pedestrians may make these modes feasible options for some drivers affected by the introduction of charges. More generally, it is likely that improving the public transport service and making it more accessible for the at-risk groups will be a more efficient use of resources. Given the profile of the at-risk groups, the improvements might include increased provision of early morning and late-night services, increased penetration of services—perhaps involving the expansion of demand responsive services, more disabled-friendly vehicles, more generous concessionary fares for elderly, disabled or unemployed people, and improved information about services in all relevant languages. Where public transport is not a viable option then thought might also be given to the encouragement of other alternatives such as car sharing and community-based transport.

There may be situations in which the best way to limit the impact of the introduction of road charging on at-risk groups might have little or nothing to do with transport. For example, it might be that, by relocating key facilities (such as benefit offices or budget shops) outside the charge area, the at-risk groups would no longer need to travel into the charge zone.

It appears that a policy under which charges are proportional to distance driven within the charge area would have less serious consequences for at-risk groups and that, although the number of affected drivers is higher when the charge area covers a large area of the city, the number of low-income drivers having to pay significant daily charges is less than when the charge area is restricted to the city centre. Similarly, if the charge is to be based on drivers crossing a cordon, an optimally placed cordon will generally affect fewer people but to a greater extent.

5. How are public attitudes (including acceptability) likely to differ between social groups for both mandatory and voluntary options? How will take-up (and the barriers to take-up) of voluntary measures differ between groups?

No information.

6. What will impact (in qualitative terms in absence of quantitative data) of policy options be on the i) transport behaviours, and ii) CO2 emissions, of different groups?

No information.

7. What remaining gaps exist in the evidence base and how could these be filled?

Gaps as identified in the report:

Popgen-T has proved a useful tool for examining a range of road charging schemes in Leeds. The same methodology could, of course, be used to study similar schemes elsewhere. The further development and wider application of Popgen-T is discussed in more detail in our final report to sponsors where we identify four possible extensions of our work:

- a. revision of the software to deal with a wider range of characteristics;
- b. extension of the method to investigate behavioural response, and thus to allow consideration of the second-order impacts of policies;
- c. investigation of a wider range of road charging options in the Leeds study area; and
- d. investigation of a wider range of policies in Leeds or elsewhere.

The inclusion of a wider range of characteristics is conceptually simple and is only constrained by the availability of suitable data. The possibility of adding characteristics derived from sample surveys could prove particularly rewarding.

Additional thoughts: Research into impact of climate change policy options on behaviour/CO2 emissions?

Social and Distributional Impacts of Transport Climate Change Policies

BASIC INFORMATION			
Author(s)	TfL	Year of publication	Annual (2008)
Title/publication	Central London Congestion Charging: Impacts Monitoring		
Context	<i>Type of publication e.g. journal article, other article, book, book chapter, working paper, report, conference paper, response to government consultation</i>	Report	
	<i>Type of study e.g. literature review, survey</i>	Monitoring Report	
	<i>Geographic – country, region, city</i>	London	
	<i>Sample size (if relevant)</i>	various	

Synopsis of Document

Congestion Charging was introduced into central London in February 2003. In July 2005 the basic charge was raised from £5 to £8 per day. In February 2007 the original central London congestion charging zone was extended westwards, creating a single enlarged congestion charging zone.

This is the latest in a series of annual reports describing the impacts of congestion charging in and around central London. It provides a summary and interpretation of the growing body of evidence and insight from across the monitoring programme relating to congestion charging in general, and focuses in particular on the first year of operation of the western extension scheme.

1. What climate change policies are we concerned with?

Road user charging

2. What key groups will be impacted (positively or negatively) by different climate change policy options?

- a) What is the likely impact of the policy measures that we have considered on people's travel behaviours?
- b) Who and where will be most affected by these and how?

The travel behaviour of residents was largely unaffected by the introduction of charging, although travel into the original charging zone, particularly for shopping and leisure purposes, increased with the introduction of the residents' discount for this group. Those who continued to drive in the western extension zone after the introduction of charging were more likely to have considered another option if they were making 'discretionary' shopping, leisure and social trips; those travelling on employer's business were very unlikely to have considered another option.

- An aggregate decline in car driver trips with an origin outside and a destination inside the extension zone was observed from traffic counts and roadside interviews before and after the introduction of the extension scheme.
- The aggregate volume of car driver trips made into the original congestion charging zone from the western extension increased after the introduction of charging. However, this has not itself led to a significant increase in overall traffic volumes in the original zone.
- Increased car driver travel into the original central zone by western extension residents was reflected in an increase in the proportion of car driver trips made for shopping and leisure purposes.

- Household surveys indicated that around half of car drivers resident outside the extension, faced with paying the full charge to continue driving in the western extension zone, chose to pay the charge. Including residents of the extension zone, the proportion is higher at 65-70 percent of drivers. Of those deterred by the charge, about 40 percent are estimated to have changed to a different mode of transport and 30 percent are estimated not to have made the trip at all. These are broadly consistent with the observed traffic impacts described in Section 2 of this report.
- Non-resident 'driver-deciders', who paid the full cost of the charge themselves, were the most likely to make a change to avoid paying the charge; more than half did so. Around eight in ten of those who had the cost of the charge paid for or reimbursed, or who were entitled to the residents discount, chose to continue driving in the western extension zone and pay the charge.
- The frequency of residents' travel by car in the western extension zone for different purposes was largely unchanged after the introduction of charging, with respondents more than twice as likely to report an increase than a decrease in the frequency of travel by car (14 percent and 6 percent respectively).
- Lower income respondents were more likely to report that their travel by car had increased or decreased, and less likely to say it had remained the same. This suggests that those on a lower income place a higher value on the cost of the charge, both encouraging them to avoid paying it but, where this is not possible, to ensure that it is not 'wasted'.
- A quarter of western extension residents reported that they had increased their car travel to the original charging zone, particularly for shopping and leisure purposes, corroborating findings from the roadside interview surveys.
- Drivers who had chosen to continue driving in the western extension after the introduction of charging and pay the charge tended to do so because they were travelling on behalf of their employer, because they felt they had no choice, or because it was easier or more convenient and to save time.
- The majority of drivers who had chosen to drive in the western extension zone and pay the charge had not considered any alternatives for their most recent trip. Of those who had considered another option, travelling by a different mode was commonly considered. Those who would not use public transport even if services were improved or who considered driving in London to be a necessity were the least likely to have considered any alternatives.
- Around a quarter of western extension resident drivers and around four in ten western extension charge payers said that they found the charge difficult to afford. Unsurprisingly, those on a lower income were more likely to say that they found the charge difficult to afford.

More detailed information available in chapter 6 'Travel behaviour and travel behaviour change' (page 113 onwards).

Key business and economic impacts (chapter 8):

- The four quarters of weekday retail footfall traffic, since the start of charging in February 2007, show a continuation of the downward trend which pre-dates charging. Weekend retail footfall data show comparable declining trends.
- In the six months after the introduction of charging, rental value growth of office properties in the western extension zone was stronger than in the rest of inner London. Retail rental growth in the western extension zone rose ahead of comparable locations such as Bromley, Kingston and Richmond.
- It is important to note the financial and business difficulties associated with the 'credit crunch' did not materially impact the property markets until around the fourth quarter 2007.
- Business owners and employers in the western extension zone reported weaker sales and profitability in 2007 compared to 2006 in the TfL telephone survey of local businesses.
- TfL on-street surveys found that over 90 percent of shoppers and diners in the western extension said that they had not changed their trip patterns since the introduction of charging. Of the approximately 10 percent of visitors who said they had changed, the most common responses were to use public transport instead of the car or to make fewer journeys to the area.

3. What are the potential key social impacts of different climate change policy options?

- a) For each key potential social impact (bearing in mind Atkins' definition), we need to identify the policies that potentially have the (positive or negative) impact. Where impact is dependent on other factors (e.g. scope or stringency of policy, way in which investment is undertaken), these need to be identified clearly.
- b) Can any disproportionately negative affects be mitigated or positive ones be further maximized? If so, how?

There was an overall decrease in traffic collisions in the western extension area of 2 percent, with collisions during charging hours increasing by a negligible amount. Those on weekdays outside charging hours showed a 15 percent reduction. There was a 7 percent increase at weekends.

In relation to the original central London charging zone there were more substantial reductions – equating to 6 percent fewer collisions during charging hours and 9 percent fewer collisions overall. This compares to equivalent reduction of 6 percent and 7 percent respectively for the whole of Greater London.

Chapter 7 (page 133) – Social Impacts:

Key findings of roadside interviews and other monitoring surveys (more detail given in chapter 7 on the impact upon different groups such as parent and children, key workers etc):

- Three in ten 'users' of the western extension, including residents, workers and visitors captured in on-street surveys within the area prior to the introduction of charging, had reduced the frequency of their trips by car into the area; the proportion travelling into the area by car at least once a week dropped by more than a quarter. Respondents were most likely to have either reduced their car travel for social and leisure trips or to have changed to a different mode of transport for these trips.
- The proportion of London residents who reported 'ever' travelling into the western extension by car during charging hours dropped by from 26 percent to 17 percent after the introduction of charging. Shopping and entertainment trips and trips made by infrequent travellers were particularly affected.
- There was little evidence of any impact on access to shops and services; where respondents had been deterred from travelling by car they had generally switched to a different mode.
- About 40 percent of western extension users said it was easy to afford to pay the charge; around one in three western extension users said that they found it difficult to afford to pay the charge, particularly those who paid the charge from lower income or economically inactive households, disabled people and those with young children. This did not have any effect on overall affordability of travel in London; between 40 and 50 percent of London residents reported that travel was difficult to afford both before and after charging.
- About 16 percent of London residents said that they had benefited from the introduction of charging in the western extension; a similar proportion said that they had lost out. Western extension 'users' were more likely to say that they had lost out as a result of the introduction of charging (41 percent). Western extension residents (43 percent) and those who drove in the area (59 percent) were also more likely to say that they had lost out.
- On balance, both western extension 'users' and London residents considered that air quality and the environment, bus service supply and journey times, and traffic congestion and car journey times had improved since the introduction of charging in the western extension.
- Half of the western extension 'users' surveyed visited friends and family in the extended zone during charging hours at least once a week; there was no evidence of any congestion charging impact on these trips. By contrast, there was evidence that London residents had switched

mode from car to public transport for trips to friends and family in the western extension zone, although 6 percent had reduced the frequency of such trips.

- Parents were apparently less likely to drive their children to school or to childcare after the introduction of charging, at between 25 and 30 percent depending on the age of the child, from more than one third in 2006.
 - There was a drop of 40 percent in the proportion of key workers who usually drove to work in 2007, and the vast majority stated that the introduction of congestion charging was a factor in this decision. Those who did continue to drive to work tended to say that their costs had increased and that they found this difficult to afford.
 - Very few shift workers chose to drive to work in the western extension before the introduction of congestion charging and therefore there was little impact on this group. However, there was some evidence of a differential impact on key workers.
 - In general, those disabled people surveyed were largely unaffected by the introduction of charging and TfL found no evidence of any impact on the provision of services to disabled people. However, carers and visitors appear to have reduced the frequency of visits made during charging hours. Even where these were replaced by visits at other times, some disabled people said that they experienced periods of loneliness and isolation during the day and the working week.
4. How will these impacts (positive or negative) differ between social groups (distributional impacts)?
- a) Are there any disadvantaged groups or areas that may be negatively or positively affected? If so, how?
 - b) Can any disproportionately negative effects be mitigated or positive ones be further maximized? If so, how?
 - c) To what extent is the impact dependent on the area in which the different social groups live?

Covered above in question 2 – more detail available in chapter 7 of the document.

5. How are public attitudes (including acceptability) likely to differ between social groups for both mandatory and voluntary options? How will take-up (and the barriers to take-up) of voluntary measures differ between groups?

Attitudes towards congestion charging, in terms of support for the scheme and whether or not it has been beneficial, did not seem to make any difference to whether or not the driver had considered an alternative. However, those who stated that they would not use public transport even if services were improved were more likely to say that there were no convenient alternatives (67 percent compared to 58 percent). Similarly, those who considered driving in London to be a necessity were also more likely to say that they had not considered any alternatives (64 percent compared to 51 percent). Interestingly, the vast majority of respondents to this survey stated that driving in London is a necessity (78 percent).

Few respondents considered that they were experiencing any benefits as a result of the introduction of charging in the western extension zone; only 20 percent agreed that the introduction of the charge had been beneficial and that it is easier to drive in the western extension area, with more than half disagreeing with both statements.

6. What will impact (in qualitative terms in absence of quantitative data) of policy options be on the
i) transport behaviours, and

An increase in bus patronage - The available pre-extension data are somewhat inconsistent. However, for 2007, both indicators are suggesting substantial increase in bus patronage in relation

to the western extension over 2006, and also that these increases are being satisfactorily accommodated by additional bus service provision.

TfL anticipated an increase in bus passenger demand from the scheme as a proportion of former car users changed mode. A number of planned improvements to the bus network were therefore introduced before the start of the scheme, as described in the *Fifth Annual Impacts Monitoring Report*. This has led to more buses entering and leaving the extension zone, which has had the effect of reducing average bus occupancy.

Patronage of the Underground has steadily increased in the past few years across the entire network. The level of patronage, the highest in the past six years, represents an increase of 10 percent compared to 2002, prior to the introduction of charging in central London.

TfL expected that the western extension could lead to a small net increase in Underground patronage, reflecting an element of modal shift to Underground by former car users, counterbalanced by a shift away from Underground to buses, in response to bus network improvements. Given the general rate of increase in the number of passengers using the Underground it is difficult to differentiate and quantify any specific impact of charging.

ii) CO₂ emissions, of different groups?

Details about CO₂ emissions generally and broken down by vehicle 'type' i.e. car, taxi, light goods, but not broken down into different social groups.

In 2007 there was a reduction of 11 percent in the vehicle-kilometres driven by vehicles with four or more wheels in the western extension zone during charging hours on a typical weekday. This was at the lower end of TfL's expectations of between 10 and 14 percent.

Cars and minicabs have seen the greatest reduction, and in terms of traffic composition, they now make up about 54 percent of traffic in the western extension compared to 60 percent in 2006. Overall, the distance travelled by potentially chargeable vehicles has declined by 14 percent and they now comprise around 72 percent of the traffic circulating in the western extension.

Traffic in the area immediately outside the western extension zone is likely to be affected by the scheme in two opposing ways. Firstly, some trips previously made to and from the extension zone may divert around the zone, using roads somewhat beyond the actual boundary route and leading to possible local increases in traffic. Secondly, radial trips no longer made to or from the extension zone will be removed from the road network, leading to an overall small decline in traffic in an 'annulus' around the zone.

Initial estimates of the impact of the traffic changes brought about by the scheme (Western Extension) on emissions of key air pollutants suggest that the extension scheme has led to reductions inside the extension zone of 2.5 percent in emissions of NO_x, 4.2 percent in emissions of PM₁₀ and 6.5 percent in emissions of CO₂ inside the extension zone itself. These reductions are smaller in magnitude than those associated with the original central zone in 2002/03, largely reflecting the impact of 'background' improvements to the performance of the vehicle fleet in the intervening period, and the exclusion of traffic speed changes, given the inconsistency of this measure during 2007.

Long-run trends for measured air quality show a continuation of the patterns described in previous annual impacts monitoring reports, with effectively stable average concentrations of key pollutants. Absolute pollutant concentrations and trends at individual site groups largely reflect site-specific influences as well as medium-run weather patterns. These influences are again seen to be considerably more significant in determining concentrations than any impacts from charging.

The beneficial impacts of the scheme occurred between 2002 and 2003. These were estimated at scheme-attributable reductions of 8 percent to emissions of NOX, 6 percent to emissions of PM10 and a reduction of 16 percent in emissions of CO2. All these figures were for emissions from all road traffic sources (only), on an annual total basis.

Between 2003 and 2006, annual improvements from this source in central London were of the order of 6 percent for NOX, 7 percent per year for PM10 and 1 percent per year for CO2. Over time therefore, and while valuable, the emissions benefits from the scheme became subsumed within the wider trend towards reduced road traffic emissions in London.

In terms of traffic volume and composition change, the area inside the extension zone is benefiting from significant reductions to emissions of key pollutants. Emissions of oxides of nitrogen (NOX) have reduced by 2.5 percent; particulate matter (PM10) by 4.2 percent; and emissions of carbon dioxide (CO2) by 6.5 percent. The impacts are broadly neutral on the western extension boundary route (within plus/minus 1 percent). These reductions relate to an annual average day, for road traffic emissions only, and include non-exhaust road traffic PM10 emissions.

Previous annual monitoring reports have shown that although congestion charging and other changes originally led to reductions in emissions, this did not feed through to observable improvements to measured air quality. This was to be expected, for reasons explained in previous reports. However, all other things being equal, reduced emissions will feed through to relative improvements in outdoor air quality, against conditions in the hypothetical absence of the scheme.

7. What remaining gaps exist in the evidence base and how could these be filled?

The report does not assess gaps.

Research into impact of climate change policy options on emissions?

Research into the impact on CO2 emissions of different groups?

Social and Distributional Impacts of Transport Climate Change Policies

PART A – BASIC INFORMATION				
Author(s)	Barham, P, and May, A (University of Leeds)		Year of publication	2009
Title/publication	CURACAO: State of the Art Review, Ch.10: Equity			
Context	<i>Type of publication e.g. journal article, other article, book, book chapter, working paper, report, conference paper, response to government consultation</i>		Report	
	<i>Type of study e.g. literature review, survey</i>		Review of literature and practice	
	<i>Geographic – country, region, city</i>		Looks at schemes worldwide, e.g. UK, America, Paris	
	<i>Sample size (if relevant)</i>			

Synopsis of Document

The aim of CURACAO is to monitor the results of the implementation of road pricing as a demand management tool in urban areas. The project is doing this by working with cities interested in pursuing road pricing to identify the barriers to their doing so, and providing evidence on ways of overcoming those barriers. That evidence is being provided in two forms: through a series of case studies and in an annually updated State of the Art Report, both of which will be disseminated through the project website and a series of workshops.

1. What climate change policies are we concerned with?

Road user charging

2. What key groups will be impacted (positively or negatively) by different climate change policy options?

- a) What is the likely impact of the policy measures that we have considered on people's travel behaviours?
- b) Who and where will be most affected by these and how?

It is possible that **people on a low income** might be disproportionately affected by urban road user charging because they might have less choice and less flexibility in terms of when and how they travel. For example, people in low-paid employment might be bound by rigid shift patterns, or restricted by child-care arrangements; in the context of personal mobility, people on a higher income are more likely to be able to afford public transport fares, as well as run a private car. Furthermore, **older and disabled people**, who are more likely to be on a low income than other members of society, are also more likely to find that they have fewer accessible and affordable alternatives to the private car.

Conversely, if, as is sometimes the case, poorer households are concentrated in inner city areas, low income residents may be the main beneficiaries of reduced traffic levels. Such benefits might manifest themselves in cleaner air, reduced noise and visual intrusion, reduced community severance and improvements in road safety.

In the UK, the RAC Foundation for Motoring has also pointed out the dangers of some people being disproportionately disadvantaged by urban road user charging (Rainger, 2008). In particular, the Foundation emphasises that people most at risk of being disadvantaged are those who have least flexibility for making life changes in order to offset any change in the cost of mobility. This refers to

the fact that some people might find it very difficult to change the location of their employment, of their home or of their children's school. More generally, the Foundation argues that Urban Road User Charging can be a factor that restricts the range of economic choices available to people, by discouraging them from seeking employment in a city that is subject to a congestion charge, or by discouraging them from commuting further afield in order to secure a better position.

It is also important to consider people located outside the charging zone, particularly those who are resident just outside the boundary of a scheme. Whilst residents might not pay a charge for travel or parking in their immediate locality, they may well experience additional diverted traffic and pressure to park immediately outside the zone. As Hau (1992) suggested, there might also be an adverse impact on people who travel in areas adjacent to charging zones. Drivers may experience increased volumes of traffic and congestion due to diverted traffic, and some will react by driving around the cordon to avoid the charge.

The importance of the equity aspect of urban road user charging lies in the fact that the "winners" and "losers" as a result of a scheme might come from different socioeconomic groups. Proposals for introducing such a charge become especially sensitive when there is a perception that it is poorer households who might be disadvantaged. The issue of whether revenues from an urban road user charging scheme are reinvested in public transport is also very important. If revenues are not redistributed in improvements to public transport, cycling and walking infrastructure etc, research has suggested that urban road user charging will generally result in gains for higher income groups – who are more likely to be car drivers - and losses for lower-income car users.

In New York City, the debate surrounding urban road user charging has focused on apparent racial, as well as income, inequalities in commuting times, since 64% of earners of \$35,000 per year or less have a daily commute in excess of one hour each way, whilst this figure is only 6% for earners of \$75,000 or more p.a. Afro-American residents are over-represented among those with a commute of more than 50 minutes. It was argued that urban road user charging might alleviate such inequalities.

Bureau and Glachant (2008) examined the distributional effects of nine urban road user charging scenarios on different income groups in Paris. The analysis showed that **high income motorists**, who generally have a higher value of time than lower income motorists, are less inclined to be deterred from driving as a result of the imposition of a toll. The result of this is that they are subject to greater disbenefits than lower income drivers, because they continue with tolled motoring when lower income drivers have already switched to using public transport. When impacts were considered in terms of generalised cost as a percentage of individuals' income, it was found that all nine scenarios were regressive, since lower income drivers were invariably disproportionately affected.

The inquiry (Edinburgh) concluded that people who do not have a car cannot be adversely affected by the charging scheme, except from the point of view of a slightly reduced likelihood of being given a lift by car drivers. This conclusion failed to consider negative impacts identified elsewhere, such as the possibility for consequent over-crowding on public transport services (at least in the short term), and the potential for the spatial redistribution of traffic, causing increased flows through less affluent areas.

Public transport users who travel in and out of the charging zone constitute another impact group that should be considered. Urban road user charging has been accompanied by better quality surface public transport in London and Stockholm. Such improvements can reduce inequities, in as much as non-car owners and those who elect not to drive would have experienced lower quality public transport before urban road user charging. A feature of many such schemes is that a proportion of the revenue gain is re-invested in other measures, including public transport. In Edinburgh, a range of public transport improvements were promised before charging was due to commence in the planned scheme.

The (Edinburgh) Inquiry Report identified people who are on the margins of being able to afford to run a car, who are most likely to be in low-paid employment, as the group of people likely to be most adversely affected by the proposed congestion charge. As the report pointed out, people in this category who are less mobile in terms of their choice of alternative employment, would be less able to make life changes in order to cope with the increased cost of travelling by car, and some, such as shift workers, would have few, if any, alternative options for travelling to work. The report's conclusion, however, was that such problems would be alleviated in the longer term, due to planned improvements in the transport system.

In terms of the relative impact of the (Stockholm - a scheme that was adopted after a successful referendum vote, during which it was presented as a "congestion tax" or "environmental charge") scheme on different groups of people, substantial variations have been found within groups, but generally,

- a. residents of the inner city and the Lidingö district pay nearly twice as much per person as residents of other areas, suggesting some geographical inequities
- b. households with a high income per household member pay nearly three times as much as low income households
- c. employed people pay about three times as much as others
- d. men pay 50% more than women.

3. What are the potential key social impacts of different climate change policy options?

- a) For each key potential social impact (bearing in mind Atkins' definition), we need to identify the policies that potentially have the (positive or negative) impact. Where impact is dependent on other factors (e.g. scope or stringency of policy, way in which investment is undertaken), these need to be identified clearly.
- b) Can any disproportionately negative affects be mitigated or positive ones be further maximized? If so, how?

Outlined within question 1.

4. How will these impacts (positive or negative) differ between social groups (distributional impacts)?

- a) Are there any disadvantaged groups or areas that may be negatively or positively affected? If so, how?
- b) Can any disproportionately negative affects be mitigated or positive ones be further maximized? If so, how?
- c) To what extent is the impact dependent on the area in which the different social group live?

Evidence on equity impacts comes in the main from three sources: predictive modelling, attitudinal research and empirical evidence from implemented schemes.

Equity impacts can be reduced in one or more of three ways:

- a. modifying the design to overcome localised adverse impacts
- b. reducing charge levels and introducing subsidies and exemptions
- c. adopting complementary measures, often using hypothecated revenues.

Information given on reducing inequities through scheme design etc:

The limited evidence from predictive and empirical studies suggests that inequities are more likely to arise from geographic status or transport use than from other causes. This suggests that changing

aspects of design can potentially reduce inequities. The most obvious examples are changing the location of a cordon to avoid areas where people have fewer alternative travel options, and limiting the operating hours to times when alternatives are readily available and users have more freedom to choose how they travel. The choice between a cordon scheme and an area scheme can also affect the distribution of impacts.

Inequities arising from economic or demographic status are more likely to be influenced by the level and incidence of charges. The simplest approach is to reduce the level of charge for all users, but beyond a certain point this will reduce the effectiveness of the scheme. Moreover, reduced charges will benefit all users.

An alternative is to reduce the level of charge for certain users. This can be done by vehicle type or for certain readily identifiable groups of user, such as residents in the London scheme. More complex subsidies are also possible. The Stockholm and Norwegian schemes have a maximum level of charge per day, thus reducing the impact on intensive users of road space. Other options considered in the literature include allocations of free permits, which allow all users a limited basic level of road use at charged times. Such subsidies will add to the complexity and costs of operating the scheme, and thus need to be carefully justified.

A third approach is to exempt certain users. This has been done in most schemes for disabled drivers, and for essential services such as emergency vehicles. A more complex scheme in Stockholm provided an exemption for vehicles from an island provided that they passed through the city centre within a given time. Once again, such exemptions add to the cost of operating the scheme, and need to be carefully justified.

In addition to reducing inequities through scheme design, they can be addressed by providing alternatives or complementary measures. The most obvious alternative is the improvement of public transport, and this has been provided in all the schemes implemented. As in London and Stockholm, bus service improvements can be targeted to the corridors on which car users are most likely to seek alternatives, or where more low income residents live. Improvements to walking and cycling can also assist. In the case of London, any surplus from revenues raised from London's Congestion Charge was required, by law, to be invested in the capital's public transport system, and the aim was to raise £1.3 billion for such re-investment on all forms of transport, including roads, local streets and railways, during the first ten years of operation.

Complementary measures are more appropriate for overcoming adverse side effects of a scheme, which themselves may lead to inequities. These include improvements to the diversionary routes, closure of rat runs and restrictions on fringe parking. Reallocation of road space within the charged area to environmental and public realm improvements may also improve conditions for those who opt to switch from car use to walking and cycling.

This issue of compensation through complementary measures is very much linked to the important concept of hypothecation. Thus inequities can be reduced by judicious reallocation of the surplus revenues. At the same time, levels of public acceptance of road user charging are likely to be higher when it is clear that such revenues are channelled into improvements that improve conditions for those who might otherwise have been adversely affected. In Shanghai, for example, a qualitative analysis (Ma *et al*, 2005) of an Electronic Road Pricing Proposal concluded that there would be limited adverse implications in terms of equity, provided that the revenues raised were reinvested in public transport. Equally, analysis in Stockholm found that the use of hypothecated revenues had a greater beneficial impact on equity than reducing the overall level of charge (Transek, 2006b).

In order to increase the public acceptability by specific revenue management, many studies suggest that the revenues should be used for improving public transport or reducing taxes. With regard to the role of public transport for the acceptability of the congestion charge, Kottenhoff and Brundell Freij (2008) show that public transport may have served a number of essential roles in the policy

package. Broadly acceptability increases when car users expect to benefit from the allocation of revenues or to be compensated for negative consequences. Also Ubbels and Verhoef (2006) show that opinions on road user charging are very sensitive to the way tax revenues are allocated. In their study a pricing measure is more acceptable when revenues are used to lower fuel taxes, car taxation or existing car ownership taxes, all of which are in the direct interest of the car driver. However, some analyses show that the preferences for revenue allocation vary strongly or are even contradictory (e.g. Schade, 1998).

In Trondheim, Norway, the toll ring attracted much equity-related criticism on the grounds that high-income motorists and commercial traffic predominantly constitute the “winners”, with those likely to lose out being people who are on a low income and car-dependent families. The solution in Trondheim was to use revenues to improve public transport, and to allocate revenue, not only to public transport improvements, but also to walking and cycling. Of the investment in these transport facilities, 60% has been funded from road user charges, with the remaining 40% being provided by the Norwegian Government.

More examples available in chapter 10, e.g. from London scheme.

5. How are public attitudes (including acceptability) likely to differ between social groups for both mandatory and voluntary options? How will take-up (and the barriers to take-up) of voluntary measures differ between groups?

Elements of scheme design have strong links to objectives, as well as acceptability. This can be exemplified by the Edinburgh case, where it was clear that the control of congestion and environmental improvement were important consequences of URUC, particularly from the point of view of public acceptability of the measures (Catling, 2001). For example, if car users were charged for outbound journeys during the morning peak, there could well be a problem of public acceptability, even though this might make total sense from the objective of revenue-raising. Similarly, there might be acceptability problems if there were the same charge imposed on an inter-peak journey away from the city centre as for a commuter trip to the heart of the city during the morning peak, even though this might make perfect sense for revenue-raising.

In San Francisco, in 2007, a survey of 600 residents found that support for the idea of urban road user charging was actually slightly higher among low-income and very low-income residents. It is thought that this might have been because of expectations for improved public transport travel times and increased public transport investment.

Another theory is that lower-income drivers are more interested in reliability of travel time, because they are more likely to incur a financial penalty for arriving late.

Chapter 12 – Acceptability:

Extensive literature demonstrates the low public acceptability of urban road user charging schemes especially within the group of motorists (e.g. Jakobsson *et al*, 2000; Schade and Schlag, 2000, 2003; Jaensirisak *et al*, 2005). For example, Figure 12-2 illustrates the acceptability of various travel demand management measures including different forms of road user charging, which shows that the road user charging options are the least accepted measures. The results of the European research project TransPrice show that only up to 16% of the respondents agree with this form of travel demand management. Somewhat more optimistically Jaensirisak *et al* (2005) found in their review of a number of British acceptability studies a mean acceptability of 35%. However, they also found considerable variations in the levels of public acceptance of road user charging ranging from 8% to 76%.

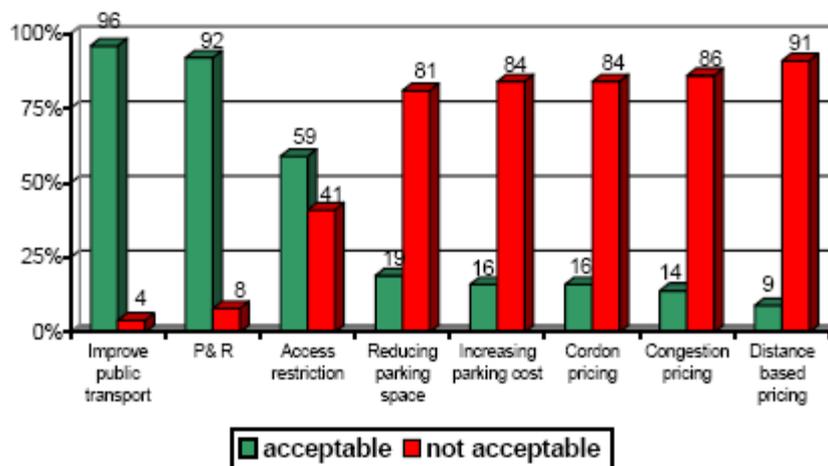


Figure 12-2 Acceptability of Travel Demand Management Measures
Source: Schade(2003)

According to economic theory, it is to be expected that high income groups should support road user charging more often because of their lower marginal utility of money, and their higher willingness to pay for saving travel time (Calfee and Winston, 1998; Rienstra, Rietveld and Verhoef, 1999). However, several studies show that there is no relationship between acceptability and level of income (e.g. Jaensirisak, 2002; Schade, 2005). Also other socio-economic factors have a smaller and more unsystematic impact on acceptability than do attitudinal factors (Jaensirisak *et al*, 2005). Schade (2005) found that especially the individual’s personal outcome expectation explains most of the variance of acceptability.

According to economists variable or dynamic road user charging is the best way of overcoming congestion problems in urban areas. Thus because of high effectiveness of these charges, the combination of *different pricing types* is very popular. However, their public acceptability is rather low (Vrtic *et al*, 2007). Some studies have revealed that people have strong preferences for simple tariffs and predictable prices – they want to know what their journey will cost before they start.

Retailers that are located within the envisaged charging zone are generally among a scheme’s most vociferous opponents. They fear the competition from retailers located outside the zone, and a resulting reduction in their customer numbers and thus lower revenues. Especially small businesses express concerns that urban road user charging would threaten their livelihoods. Also in tourism losses are expected because tourists could be discouraged from visiting cities that have an urban road user charge (DfT, 2007).

Business acceptability of the implemented road user charging schemes may also increase after the introduction, as with public opinion. For example in Stockholm between 2005 and 2006 there was a change in attitude towards the Stockholm Trial as a whole. The proportion of companies that was negative fell from about 65% to 45%. The proportion that was positive rose from about 20% to approximately 35%.

6. What will impact (in qualitative terms in absence of quantitative data) of policy options be on the
 - i) transport behaviours, and
 - ii) CO2 emissions, of different groups?

Chapter 8 – ‘Environment’

Current empirical evidence seems to indicate that when aggregated, the effect RUC has on fuel consumption factors is almost negligible (compared to the first-order effect of reduced vehicle mileage). In the Stockholm trial, the overall reduction of vehicle mileage was estimated to be 14%

within the charging cordon and 3% on a regional level (county). A model that took these reductions into account, but also accounted for changed speed profiles (and consequently changing emission factors), estimated the corresponding reduction in CO₂ emissions to be 15% and 3%, respectively. The additional reduction due to more even speed profiles was thus not more than 1% (Carlsson *et al*, 2006).

Without doubt, any policy that should contribute significantly to the required reductions in CO₂ emissions has to be applied on a national scale. Having said that, however, the reductions obtainable from local urban RUC are considerable compared to other potential local-regional policy measures. In the Stockholm case, the congestion charging contributed more to CO₂ reductions in the county than the top listed measure on the regional authority’s action plan for reduction of CO₂ emissions from transport.

In both London and Stockholm, a substantial reduction of those vehicle emissions with negative health impacts is estimated to have taken place as a consequence of RUC schemes.

In both cities, NO_x and PM emissions decreased less than vehicle mileage. That is primarily due to bus traffic increases as a consequence of the charging package. In comparison with private cars, buses have high emissions of NO_x per vehicle kilometres. In Stockholm, there were some streets on which the resulting impact of increased bus traffic and reduced car traffic was negative, so that concentrations of NO_x increased after charging.

Table 8-1 Effects from RUC schemes in London and Stockholm on vehicle emissions within the charging zone/cordon.

<i>Indicator</i>	<i>London (2003/2005)</i>	<i>Stockholm (2005/2006)</i>
Change in CO ₂ emissions	-16 %	- 13% (inner city)
Change in NO _x emissions	- 8 %	- 8,5 % (inner city)
Change in particulate emissions	- 7 %	- 13 % (inner city)
Change in number of vehicles entering the zone	- 17 %	- 17 % (April)

Source: CURACAO(2008)

7. What remaining gaps exist in the evidence base and how could these be filled?

Gaps as identified in the report:

Environment

Firstly, it is unclear as to the effect that congestion “in itself” (driving characteristics) has on emissions. There seems to be a general assumption among the public as well as “congestion-oriented” traffic researchers, that reducing *congestion* (less stop-and-go, more “smooth” driving) is important to improve urban air quality. The limited research in this area seems less conclusive, and does anyway point clearly to the fact that reducing *volumes* is much more important than reducing *congestion* per se.

Secondly, there seems to be room for trans-disciplinary research centred on consensus-building for charging based on combinations of congestion and environment arguments. To what extent do these arguments appeal to the same segment of voters? To what extent are those arguments automatically conflicting through basic antipathy (so that e.g. those that want to support an environmental policy, would be against if it turned out to reduce congestion)

Finally, there is a need to combine analyses of short term adaptation to charging, and long term decisions with respect to car ownership. Only on the basis of such a combined analysis would it be possible to identify reasonably “optimal” combined strategies with respect to charging exemptions (or reductions) for green cars, other types of economic incentives for car fleet transition, and charging effectiveness.

Equity

The importance of gaining a better understanding of equity issues, especially in relation to different city contexts and types of scheme, lies in its implications for acceptability. Where there is a culture for the implementation of an Urban Road User Charging scheme to be dependent upon the result of a referendum, there is a strong requirement to understand which sectors of the population will be affected by a proposed scheme, and in what ways. Such intelligence will facilitate ways in which potential perceived or actual inequities can be identified and mitigated. Such issues can be investigated retrospectively in cities where a referendum has led to public rejection of a scheme, (such as in Edinburgh and Manchester, in the UK), so that lessons can be learnt for the planning of similar schemes in the future. Where individuals are given the opportunity to vote on whether to accept a scheme or not, their decisions will largely be based on the balance of the anticipated positive and negative impacts upon them. However, perceived fairness to others may also influence their decisions.

Even where a referendum is not planned as part of the implementation process, if public acceptance is considered to be important, then there is the need to develop more sophisticated ways of assessing the impact of different types of URUC scheme on different sectors of the population. The level of sophistication should enable tradeoffs to be made between monetary costs to different users; impacts resulting from changes to travel times, environmental improvements and enhanced quality of life; and benefits arising from the distribution of revenues raised from URUC (such as improvements to public transport, improvements to walking & cycling facilities, and tax rebates). A better understanding of how different people are affected will make it easier for scheme promoters to identify potential sources of concern among the affected population, and to include mitigating and compensatory measures, where required.

A knowledge base of the way in which different types of scheme are likely to impact upon different sectors of the population can only be developed on the basis of both predictive and empirical evidence from a variety of schemes throughout the world. Such evidence will continue to become available. Information on current research into equity-focused design tools would be of interest to CURACAO. A more comprehensive understanding of the ways in which different people might be affected by URUC schemes should lead to the production of clearer guidance on ways of designing schemes to reduce such inequities.

Acceptability

There is a lack of knowledge of the circumstances which could make a public referendum a promising way to introduce urban road user charging. Further it is rather unclear how the benefits of road user charging schemes influence acceptability. The assumption is that once the scheme has been introduced the effectiveness of such a scheme becomes apparent to the citizens and changes their mind in a positive direction. However, the exact nature of the relation between scheme benefits and acceptability is not known. The scheme benefits that will influence acceptability are the time savings and environmental improvements.

However, it is uncertain that travel time reduction and environmental improvement are perceived by the public to be worthwhile enough to compensate for the charge {Giuliano, 1992 #556; Harrington, 2001 #560}. Jaensirisak *et al* (2005) found that among the potential impacts of charging, an ability to

achieve substantial environmental improvements was the single most important contributor to increased acceptability, followed by contributions to reducing delayed time for cars.

Social and Distributional Impacts of Transport Climate Change Policies

PART A – BASIC INFORMATION			
Author(s)	David Levinson	Year of publication	2009
Title/publication	Equity Effects of Road Pricing: A Review		
Context	Type of publication e.g. journal article, other article, book, book chapter, working paper, report, conference paper, response to government consultation	Working paper	
	Type of study e.g. literature review, survey	Literature review	
	Geographic – country, region, city		
	Sample size (if relevant)		

Synopsis of Document

This paper provides a synthesis of the literature to date on both the theory of equity, as applied to road pricing, and the findings of empirical and simulation studies of the effects of particular implementations of road pricing, and suggested remedies for real or perceived inequities. To summarize, while there are certainly potential issues with equity associated with road pricing, those issues can be addressed with intelligent mechanism design that provides the right incentives to travellers and uses the raised revenues in a way to achieve desired equitable ends. These include cutting other taxes and investing in infrastructure and services.

1. What climate change policies are we concerned with?

Road pricing

2. What key groups will be impacted (positively or negatively) by different climate change policy options?

- c) What is the likely impact of the policy measures that we have considered on people's travel behaviours?
- d) Who and where will be most affected by these and how?

Parkany (2005) identifies the equity issues associated with transponder ownership (i.e. to enter a charging zone). Acquiring a transponder is a barrier to entry for many who wish to use roads metered by electronic tolls, and it turns out that many low income households do not have either credit cards or bank accounts that are often necessary pre-requisites to transponder ownership. Examination of SR-91 and Pennsylvania Turnpike data shows wealthier individuals are both more likely to own transponders, and use electronic toll lanes more often given they own transponders. For routes like HOT lanes where transponder ownership is mandatory to access the system, this may pose an additional equity issue, while when there are alternatives such as manual payment, the effect is not as severe. A study of SR91 by Sullivan (2000) found lower-income drivers approved of the lanes almost as much as wealthier drivers, though wealthier drivers did make more use of the facility.

The QuickRide system is a high-occupancy toll lane along the Katy Freeway in Houston. Burris and Appiah (2004); Burris and Hannay (2003) found that while usage among enrollees did not vary by income, the decision to enrol was correlated with income, with high income travellers more likely to enrol in the system than those with lower incomes. Further the system is more widely used by long-distance than short distance travellers, and by commuters more than travellers engaged in non-work trip purposes.

The proposed national road user charge in England has been examined (Glaister and Graham, 2005, 2006), finding that if revenues are recycled through a reduction in the fuel tax, benefits accrue to rural more than urban residents, in contrast with the current situation in England (with its high fuel tax) where rural residents overpay compared with urban residents.

Category	Winners	Losers
Unchanged, fee charged (Tolled)	Travelers valuing the time savings higher than the fee.	Travelers valuing the time savings below the fee, but having only unattractive travel alternatives.
Changed to toll facility (Tolled on)	Persons now finding it profitable to undertake trip (or change trip timing, route, or mode choice,) even with a fee because the travel time will be reduced.	
Changed from toll facility (Tolled off)	Travelers who switch from driving to bus or HOV services which are now better because of lower congestion.	Persons abstaining from travel or changing to less attractive travel times, routes or modes to avoid fee.
Unchanged, fee not charged	Public transport and HOV users experiencing time savings.	Persons experiencing congestion on road or on public transport caused by persons who have changed travel behavior to avoid fee.

Table 1: Travelers who win and lose from road pricing

3. What are the potential key social impacts of different climate change policy options?

- a) For each key potential social impact (bearing in mind Atkins’ definition), we need to identify the policies that potentially have the (positive or negative) impact. Where impact is dependent on other factors (e.g. scope or stringency of policy, way in which investment is undertaken), these need to be identified clearly.
- b) Can any disproportionately negative affects be mitigated or positive ones be further maximized? If so, how?

Ison and Rye (2005) notes how equity in the London congestion charging scheme can be achieved by providing exemptions from the charge for certain groups, e.g. “alternative fuel vehicles; vehicles driven by or carrying disabled people who have registered for a 100% discount ; emergency vehicles; vehicles with nine or more seats; motorbikes and mopeds; black cabs and London-licensed mini-cabs; and residents within the charging zone (who get a 90% discount)”. “[T]he key in terms of acceptance is to keep the inequity to a minimum.”

Eliasson and Mattsson (2006) examines the then proposed Stockholm road pricing case for equity consequences. The two key issues they argue for equity are who is affected by the charge and how is the revenue used, which are much more important than any other issues such as value of time. In the case of Stockholm, it is argued men, the wealthy, and those living in the city centre are affected most by the charge, while the revenue spending on public transport benefits women and those with lower incomes, and thus the scheme is progressive.

4. How will these impacts (positive or negative) differ between social groups (distributional impacts)?
- Are there any disadvantaged groups or areas that may be negatively or positively affected? If so, how?
 - Can any disproportionately negative affects be mitigated or positive ones be further maximized? If so, how?
 - To what extent is the impact dependent on the area in which the different social group live?

Overall, while the HOT lanes (High Occupancy Toll Lanes – mainly implemented in the US) tend to benefit the better-off more than the poor, acceptability after implementation is widespread across groups, and all groups make some use of the guaranteed reliable travel times that HOT lanes offer (everyone is in a hurry sometimes).

Teubel (2000) examines the effect of introducing road pricing on commuters in Dresden, Germany. As is commonly found, in the absence of revenue recycling “All measures indicate that the welfare is distributed more unequally after the introduction of road pricing than before. Both components of the welfare changes analysed before contribute to this effect. The toll itself as well as the travel time gains separately enlarge inequality.” Revenue recycling can remedy the inequity provided the toll collection costs are not too high.

Parry and Bento (2001) considers the issue of how road pricing affects labour force participation. Theory suggests higher commuting costs will discourage the marginal commuter (the cost of the toll exceeds the benefit of congestion reduction for most travellers), and in most of the authors’ numerical simulations, the welfare gains from road pricing (internalizing congestion costs) is less than the efficiency cost in the labour market. The authors suggest recycling the revenue to reduce labour taxes, offsetting the penalty associated with road prices, and that this is more effective than providing transit subsidies or providing a lump-sum payment to households (which does not encourage labour force participation).

5. How are public attitudes (including acceptability) likely to differ between social groups for both mandatory and voluntary options? How will take-up (and the barriers to take-up) of voluntary measures differ between groups?

Ison (1998) discusses the issues of implementing road pricing, and presents evidence that without revenue recycling, pricing is generally considered unacceptable, and the preferred way in the UK to allocate revenues raised from pricing was to public transport locally, and to local roads secondarily.

Examining the I-15 HOT lanes in San Diego, Supernak et al. (2002) states “Equity issues did not emerge despite the fact that FasTrak users came from the highest income groups.” Users perceived the system as fair, as it was seen that travel time benefits went to those who paid.

Smirti et al. (2007) summarizes literature and interviews a number of players for various congestion charging proposals in California. There was consensus that to achieve political acceptability, excess revenues should remain within the project corridor, and especially be allocated for transit.

Dill and Weinstein (2007) reports “A poll of Washington state residents found that more people felt that tolls were fairer than increasing the gas tax if more funds were needed. Respondents who were specifically asked about fairness to lower income groups felt even more strongly, with 52% indicating that tolls were fairer than increased gas taxes (27%) (Lawrence, 2006)”

Raj'e (2003) conducted a series of focus groups analyzing a potential city-centre road pricing scheme in Bristol, England, interviewing groups that are potentially socially excluded (ethnic minorities, non-English speakers, elderly, and young). The author concludes " [P]ublic acceptability of road user charging will be directly related to its perceived effects on local residents." Recycling the revenue to local transport initiatives would be important in addressing issues of fairness of the system to socially at-risk groups and thereby promoting social inclusion, but car-based transport will still be important for many members of these groups, and taxi and paratransit should be considered as possible recipients of recycled revenues. Lucas et al. (2001) found that even non-drivers opposed the then-proposed scheme in Bristol.

6. What will impact (in qualitative terms in absence of quantitative data) of policy options be on the
i) transport behaviours, and ii) CO2 emissions, of different groups?

No information.

7. What remaining gaps exist in the evidence base and how could these be filled?

The working paper does not assess gaps.

Research into impact of climate change policy options on behaviour/emissions?

Social and Distributional Impacts of Transport Climate Change Policies

BASIC INFORMATION		
Author(s)	Parkhurst G.for DfT	Year of publication 2006
Title/publication	<i>Developing guidance and advice to address the social and distributional impacts of road pricing (Understanding the Social and Distributional Impacts of Road Pricing)</i>	
Context	<i>Type of publication e.g. journal article, other article, book, book chapter, working paper, report, conference paper, response to government consultation</i>	Rapid evidence assessment of the Social and Distributional Impacts of Road Pricing
	<i>Type of study e.g. literature review, survey</i>	Literature Review (Rapid evidence assessment)
	<i>Geographic – country, region, city</i>	Covers schemes worldwide
	<i>Sample size (if relevant)</i>	Over 100 reports, papers and other articles addressing research in the UK and Europe, North America, and Asia.

Synopsis of Document

The overall aim of the study was to evaluate the available evidence on the social and distributional impacts of existing and 'near market' road pricing schemes. Taken together, the evidence describes the state of international knowledge about the likely distributional effects that result from road pricing schemes, as people alter the extent to which (and/or way in which) they meet their needs and aspirations for travel.

In terms of types of road pricing scheme - each of which could theoretically create subtly different distributional effects - evidence relating to five kinds of scheme was expected:

- Fixed area charging;
- Fixed cordon charging;
- Route based charging;
- Nationwide congestion charging; and
- Nationwide universal distance-rated charging.

The published research reviewed has not indicated that there is conclusive evidence that road pricing will have impacts on particular groups: rather that there is a lack of published work on this issue. DfT has a broad programme of research in progress on these issues which will increase its understanding of the potential social and distributional impacts of road pricing.

1. What climate change policies are we concerned with?

Road pricing

2. What key groups will be impacted (positively or negatively) by different climate change policy options?

- a) What is the likely impact of the policy measures that we have considered on people's travel behaviours?
- b) Who and where will be most affected by these and how?

The document reviews the effect of road pricing upon:

a. Income groups;

- b. Age;
- c. Gender;
- d. Ethnicity;
- e. Household type;
- f. Disabilities;
- g. Scheme design and boundary questions;
- h. Spatial issues; and
- i. Transport modes.

A number of social groups were identified *a priori*, as being likely to be affected in distributional terms by road pricing. These included:

Demographic groups

- Different genders
- Children and young people (up to the age of 25)
- Middle generational people (aged between 26 and 50)
- Older people (aged over 50)
- Families (with dependent children aged 15 and under).

Groups prone to social exclusion on accessibility grounds

- Disabled people
- Households without access to cars
- People unaware of travel opportunities
- Low-income households

Geographically defined groups

- Rural
- Suburban/peripheral estate
- Urban core

Economically or occupationally-defined groups using Socio-economic Classification occupation classes

- People in education
- People in unpaid or voluntary work
- People seeking work
- Part-time workers
- Key workers
- Home makers
- Those with long standing illness/disability
- Carers
- Retired people

Groups defined through their transport choices

- Bus users
- Car users
- Pedestrians
- Cycle users
- Users of powered two-wheel vehicles

It was expected that little or no evidence might be identified for some of these specific groups, but that additional groups, not identified *a priori*, might be described in the evidence.

Income Groups

The overwhelming evidence from around the world is that road user charging schemes tend to be used predominantly by those on higher incomes.

An assessment of the proposed (but eventually aborted) congestion charging scheme in Edinburgh on low income households found that people with lower incomes were significantly less likely to cross a cordon and be charged than people with higher incomes. This situation is linked to lower car ownership levels and higher use of non-car modes of transport, and particularly for journeys during work hours. The interpretation given was that those on lower-incomes were less likely to be affected by the proposed charge. Furthermore, as revenues were to be spent on transport, and mostly on public transport, lower income and socially excluded people would primarily benefit.

Demographics

A persistent finding across a range of studies of road pricing projects is that there is a tendency for users of tolled roads to come chiefly from the middle-aged group. However, it is concluded that the implications for equity remain an open question, lacking explicit determination of whether the users and non-users within the age (and gender) classifications are being benefited or disbenefited.

It is suggested that a higher *value of reliability* provides one possible explanation for the consistent findings across nearly all studies on both the *SR91* and *I-15* corridors (variable-toll express lane facility in Orange County, California and San Diego respectively) that, other things equal, women are more likely than men to choose the toll road. A possible reason is that women have more childcare responsibilities, which reduce their scheduling flexibility.

There is undoubtedly a general paucity of research concerning ethnicity and road pricing social and distributional impacts. The report (Bristol travel diaries) notes that if Asian residents are, as the evidence implies, most likely to be affected by road user charging because of high levels of car/van dependence, it follows that they could be most vulnerable to the exclusionary effects of the charge. It is also concluded that the Asian elderly, who described unfamiliarity with bus use at associated focus groups, may end up forfeiting journeys if they cannot afford increased travel costs associated with a cordon charge, and are unable to use the bus services.

For two of the most prominent urban pricing schemes in the US (Houston HOT lanes and Port of New York and New Jersey Time of Day Pricing Initiative), findings suggest that the majority of users come from relatively small middle-class households. The subject of household type, and the related one of nature of social networks, does not appear to have received a great deal of attention in the design of toll schemes, although pricing can apparently have some adverse social effects. For example, a MORI survey on the impacts of the *LCC* (London Congestion Charge) found that meetings with family and friends had clearly been affected.

For the most part, the Blue or Orange Badge exemption from the (London Congestion) charge was welcomed, although one respondent pointed out that 'special treatment' could make non-disabled people antagonistic towards disabled people.

3. What are the potential key social impacts of different climate change policy options?
 - a) For each key potential social impact (bearing in mind Atkins' definition), we need to identify the policies that potentially have the (positive or negative) impact. Where impact is dependent on other factors (e.g. scope or stringency of policy, way in which investment is undertaken), these need to be identified clearly.
 - b) Can any disproportionately negative affects be mitigated or positive ones be further maximized? If so, how?

It is important to emphasise that the evidence base on social and distributional impacts is extremely limited, and little literature exists of which social and distributional impacts are the primary focus of research. Although relatively little is known about the possible first-order effects of scheme design,

such as impacts on different income and social groups, virtually nothing is known about the second-order effects.

Distributional Effects

In increasing the money costs of road travel, it may increase the economic exclusion of those who must continue to travel by road but can only afford to pay by reducing expenditure on another good or service generally regarded as a basic of life, resulting in a negative distributional effect. However, if introducing a congestion charge results in lower time costs of travel for those that pay the toll, it may enable those previously excluded from participation in certain activities, due to the length of journey to reach them and limitations on time to spend travelling (travel budget), to take part, so having a positive distributional effect. Similarly, there may be positive distributional effects for bus users in terms of temporal exclusion, if the services become quicker or more reliable as a result of decongestion. Transport exclusion may also be reduced if the improved operating conditions result in more, different bus services being introduced, creating mobility opportunities for those desired journeys not previously served by a route.

Social Exclusion

A persistent theme concerning road pricing and matters of social exclusion is that it is people with no alternative to using a car who are the most vulnerable. There are difficult choices to be made for lower-income households in those areas where limited local employment opportunities, the rise of irregular and anti-social work hours, and inadequate public transport facilities force them into running a car at considerable expense.

Lower income people with no car access can also suffer from the wider effects of road pricing. For example, in his assessment of the *LCC*, Richards notes that there is evidence that the arrangements for the reimbursement of those who are seriously ill and need to visit medical facilities within the charged area are creating difficulties, and that the charge is also creating problems for those requiring support from the voluntary sector. In monitoring the social impacts of the Congestion Charge, Transport for London reports that, at least in the charging zone itself, most respondents had not perceived any change in their accessibility to local shops, facilities and services. Of those who did, three times as many said accessibility had got better than said it had deteriorated.

A study of equity and efficiency for the proposed Edinburgh congestion charge emphasises that, on matters of social exclusion, several reports and stakeholders argue that access to low cost nutritional foods is becoming more difficult for low-income families, with the siting of major retail facilities away from the most socio-economically disadvantaged areas, leaving very limited shopping choices. It is also noted that there are growing accessibility problems with regard to health facilities. The authors argue that identifying the charting of the cordon against known areas of social exclusion and transport deprivation was a necessary component of an equitable congestion charging scheme. However, they observe that there is no current evidence to suggest that this exercise or any similar form of mapping has been undertaken.

There appear to be few studies that attempt to place age and use of road pricing in a wider social context, and to examine the equity implications.

There is a need for hypothecated revenue spending to be directed towards educational and marketing campaigns, including travel training, in appropriate languages to make public transport alternatives more accessible to this population (Asian elderly).

4. How will these impacts (positive or negative) differ between social groups (distributional impacts)?
 - a) Are there any disadvantaged groups or areas that may be negatively or positively affected? If so, how?

- b) Can any disproportionately negative effects be mitigated or positive ones be further maximized? If so, how?
- c) To what extent is the impact dependent on the area in which the different social group live?

Some information on how negative effects of road pricing may be mitigated:

Alternative solutions considered in the US to addressing problems of equity concern some kind of explicit compensation to low income groups, such as toll credits, similar to credits provided to low income utility customers; tax credits to low income commuters for tolls paid by them on value priced lanes; or toll credits provided to those who choose not to use value-priced lanes, this latter a component of the FAIR lanes concept.

A range of five factors that may mitigate or aggravate questions of equity: the basis of charging; the area covered by the charge; the time period covered by the charge; discounts or exemptions; and linkages to other transport charges.

Qualitative research on the *LCC* found that a significant number of lower-income people live in relatively close proximity to their places of work, and so do not need to pay the charge.

- 5. How are public attitudes (including acceptability) likely to differ between social groups for both mandatory and voluntary options? How will take-up (and the barriers to take-up) of voluntary measures differ between groups?

It was found that **disabled people** had a fairly positive attitude towards congestion charging, and many hoped that it would deter private car journeys. Respondents felt that the scheme would not work as well as greater pedestrianisation and restrictions on private car use, because the charge was too low and people would continue to use their cars. They were particularly concerned about the impacts on low-paid essential workers like carers or nurses, who would suffer financial hardship. Some anticipated that, if the scheme worked, there would be a greater demand for public transport, and that this would have a negative impact on disabled people, some of whom are dependent on these transport modes. They felt that their needs were already often not met, and if a situation of growth in demand for public transport did arise, it would be exacerbated by disabled peoples' needs not being considered a priority by policymakers and operators.

The case of Edinburgh and the boundary issue illustrates how a gap between official decisions and public perceptions of equity (or the lack of it) can have overwhelmingly negative effects on public acceptability.

- 6. What will impact (in qualitative terms in absence of quantitative data) of policy options be on the i) transport behaviours, and ii) CO2 emissions, of different groups?

Spatial factors can also be influential in the relationship between road pricing and wider social and environmental factors. For example, a paper investigates the relationship between urban air quality, represented by *nitrogen dioxide* (NO₂) concentrations, and social deprivation in the city of Leeds. Air quality was assessed through a range of road policy options, including user charging. The data revealed that inner city Leeds is the most deprived part of the City, and the suburbs the most affluent (although this was something of a generalisation). The analysis indicated that there is social inequity in the distribution of NO₂ in Leeds, with deprived areas experiencing significantly higher ambient concentrations than communities of average or above-average affluence. However, it was found that road user charging reduced inequity in exposure to NO₂, with the extent of the reduction varying according to the charge option. It was also found that road user charging may be more effective than low-emission zones in addressing environmental inequity. In contrast, road network

developments increased environmental inequity in Leeds, the only transport option investigated to do so.

The LCC provides a notable example of a major switch of transport mode from private to public transport. Thus, a year after implementation, Transport for London reported that the biggest change prompted by the Charge was the transfer of car users.

7. What remaining gaps exist in the evidence base and how could these be filled?

As previously noted, this literature review concludes that the evidence base on social and distributional impacts is extremely limited. The following gaps were identified.

Income and Ability to Pay: Key Evidence Gaps

- a. Little is known about the impact of road pricing on low income groups, and associated problems of accessibility and participation. Thus, although the payment of the toll is not a problem for most people, it can be a big problem for a small proportion.
- b. There are major gaps in understanding the reasons why people on low incomes do not have (or consider themselves not to have) an alternative to car use.
- c. There are significant gaps in discovering why lower-income people might choose not to pay a toll, other than for economic reasons.

Age: Key Evidence Gaps

- There is only limited understanding of the social and economic context of the links between age and road pricing. Thus the life cycle can only be understood if we recognise the heterogeneity of all age groups.
- For each age group, more insights are required on personal perceptions and experiences of road pricing benefits and penalties.

Gender: Key Evidence Gaps

- Little is known about the causal reasons for gender differences on use of road pricing. For example, the USA Value Pricing Programme found that, other things equal, women are more likely to use the toll road. However, no research has been undertaken on why this might so be.
- No research appears to have been undertaken on gender differences with regard to road pricing and VoT (value of time).

Ethnicity: Key Evidence Gaps

- Little is understood about the links between road pricing and the travel behaviour of ethnic minority groups. For example, research in the Bristol area suggests that a significant proportion of Asian women are dependent on lifts, and so could be vulnerable to trip suppression as a result of road pricing. However, there is an evidence gap in discovering if this hypothesis is true in practice, perhaps to be filled by studying the case of the London Congestion Charge.
- More needs to be understood about how to overcome barriers to public transport use for some ethnic minority groups.

Household Type: Key Evidence Gaps

- There is little evidence on how road pricing impacts on family travel behaviour, such as co-ordinating work, school and leisure trips, and making visits across toll barriers.
- More needs to be understood about the links between household type and the propensity to carpool.

Disabilities: Key Evidence Gaps

- No research appears to have been undertaken on the impact of the London Congestion Charge on disabled people. For example, a survey prior to implementation of the Charge found that disabled people feared the impacts on low paid essential workers, such as carers or nurses,

who would suffer financial hardship, and perhaps be less willing to work on those roles. Concern was also expressed that 'special treatment' of disabled people, through exemptions, could antagonise non disabled people. However, no follow up research has been conducted.

Boundary Questions: Key Evidence Gaps

- There is only a limited understanding of the implications of toll boundaries on problems of social exclusion, and also environmental impacts.
- More insights are required on how to reconcile considerations of economic efficiency and social equity with regard to boundary issues.

Spatial Impacts: Key Evidence Gaps

- Little research has been undertaken on the implications of road pricing for those living in rural areas. For example, any national scheme of road pricing will have important implications for those living in rural areas that use a car, but have poor accessibility to public transport.
- More needs to be understood about the links between road pricing and wider environmental and social impacts, such as on air quality in urban areas.

Transport Modes: Key Evidence Gaps

- Little is known about the underlying reasons that may induce people to switch modes as a result of road pricing.
- Only limited research has been undertaken on the social and distributional impacts of charging on road casualties.

Additional thoughts: Research into impact of climate change policy options on behaviour/CO2 emissions?

Social and Distributional Impacts of Transport Climate Change Policies

PART A – BASIC INFORMATION			
Author(s)	DfT	Year of publication	2007
Title/publication	Transport Assessment Guidance (TAG) Unit (3.12.4), Measuring the Social and Distributional Impacts of Road Pricing Schemes		
Context	Type of publication e.g. journal article, other article, book, book chapter, working paper, report, conference paper, response to government consultation	Government document – currently 'for consultation'	
	Type of study e.g. literature review, survey	Government Guidance	
	Geographic – country, region, city	UK wide	
	Sample size (if relevant)	N/A	

Synopsis of Document

This unit explains how social research methods can be used to help to estimate and explain the social and distributional impacts of road pricing. These methods should be used to complement the information that is traditionally used in appraisal to estimate such impacts, an overview of which can be found in *Appraisal of Road Pricing Options*.

1. What climate change policies are we concerned with?

Road Pricing

2. What key groups will be impacted (positively or negatively) by different climate change policy options?
 - a) What is the likely impact of the policy measures that we have considered on people's travel behaviours?
 - b) Who and where will be most affected by these and how?

Not covered in much detail, as it is mainly about how local authorities can undertake research for schemes:

It is important to identify if any negative first or second order impacts are disproportionately concentrated amongst groups who may already be vulnerable to disadvantage, such as those experiencing or at greater risk of experiencing health and/or mobility problems, social exclusion and labour market disadvantage. From a social policy perspective it is clearly important to avoid this as far as possible - local transport schemes should work alongside rather than contravene other local social policy objectives. In support of this, DfT's Feasibility Study of Road Pricing in the UK2 noted that road pricing schemes should promote social inclusion and accessibility.

3. What are the potential key social impacts of different climate change policy options?
 - a) For each key potential social impact (bearing in mind Atkins' definition), we need to identify the policies that potentially have the (positive or negative) impact. Where impact is dependent on other factors (e.g. scope or stringency of policy, way in which investment is undertaken), these need to be identified clearly.
 - b) Can any disproportionately negative affects be mitigated or positive ones be further maximized? If so, how?

Only cover how to assess social impacts – data sources and research methods.

4. How will these impacts (positive or negative) differ between social groups (distributional impacts)?
- a) Are there any disadvantaged groups or areas that may be negatively or positively affected? If so, how?
 - b) Can any disproportionately negative affects be mitigated or positive ones be further maximized? If so, how?
 - c) To what extent is the impact dependent on the area in which the different social group live?

We do not yet fully understand the social and distributional impacts of road pricing. It is acknowledged, however, that these impacts are important and that they can be positive as well as negative, depending on whom they affect and in what ways, leading a scheme to be either more or less progressive in its impacts. The balance and distribution of positive and negative impacts depends on scheme design and implementation and for this reason, these factors need to be taken into account early in the design stage, so that the positive impacts can be maximised and any negatives minimised.

The Social Exclusion Unit's report on transport and social exclusion, *Making the Connections*, highlighted some of the potential equity benefits of road pricing schemes. For example, those on low incomes often live in the most congested areas, and as a result could benefit from the effects of reduced congestion through road pricing. These are typically taken to include more reliable bus journeys, improved air quality, and reductions in traffic noise and community severance. If the package of demand management measures being considered includes, for example, improved public transport, then this could have positive distributional impacts, but it will be necessary to collect evidence to make informed decisions about how to maximise this.

DfT's recent Rapid Evidence Assessment highlighted that income is important in determining social and distributional impacts. People who are on low incomes *and* who have no or limited choice about using a car for some or all trips may be at risk of experiencing direct and/or indirect negative consequences of road pricing schemes.

Not everybody on a low income will experience negative impacts – some might experience positive or neutral impacts. This will partly depend on other factors, such as economic activity (whether they are working, looking after a family or retired for example) and whether public transport meets or can meet their needs. People living on low incomes have a range of social characteristics, which may help to determine the impact of a road pricing scheme.

It is not sufficient to limit distributional analysis to looking at different income groups. It is also important to look at the interactions between different socio-economic, socio-demographic and geographical characteristics, and to find out about the choices that are available and that can be made available to people through the package of complementary measures accompanying the scheme. The most effective way of doing this will be by conducting some social research.

A core requirement is that proposers demonstrate that they have considered the impacts of schemes on the above groups and any other vulnerable groups identified by addressing the research questions outlined in the following section.

There are many questions posed in Chapter 2 'Gathering Evidence'. These fall into the following categories:

- a. Travel Behaviour (i.e. What are the socio-demographic and socio-economic characteristics of those who travel by car and by other modes - at times and on routes relevant to the scheme?)

- b. Travel Options – Choice and Flexibility (i.e. For car trips (particularly those that may be affected by the particular scheme), what options do people feel they have other than using the car?
 - c. 'Vulnerable' Groups (i.e. Are there any 'vulnerable' groups (e.g. groups vulnerable to social exclusion; those with limited ability to pay; and those whose travel needs combine necessity of paying with limited ability to pay) that are likely to be affected by the scheme?
 - d. Complementary measures (i.e. What are the most appropriate complementary measures to include in the scheme package?
5. How are public attitudes (including acceptability) likely to differ between social groups for both mandatory and voluntary options? How will take-up (and the barriers to take-up) of voluntary measures differ between groups?

We know from previous research that equity and perceived equity are key factors in the public acceptability of road pricing schemes. A well designed scheme may well produce positive benefits for some of those who are most vulnerable to social exclusion. It is advisable to have a clear understanding of these benefits and the evidence that underpins them before engaging in detailed political and public debate.

6. What will impact (in qualitative terms in absence of quantitative data) of policy options be on the
i) transport behaviours, and ii) CO2 emissions, of different groups?

No information on behaviours or emissions.

7. What remaining gaps exist in the evidence base and how could these be filled?

This document does not assess specific gaps in the evidence base; rather it describes types of research/methods which should be utilised to assess social and distributional impacts of road pricing.

Social and Distributional Impacts of Transport Climate Change Policies

Author(s)	Sarah E. West	Year of publication	2002
Title/publication	Distributional effects of alternative vehicle pollution control		
Context			
	<i>Type of study e.g. literature review, survey</i>		
	<i>Geographic – country, region, city</i>		
	<i>Sample size (if relevant)</i>		

1. What climate change policies are we concerned with?

This paper examines distributional effects of alternative vehicle pollution control policies. The policies examined in detail are:

- A tax on miles
- Taxing engine size
- Subsidising new(er) vehicles (either by providing a subsidy for a new vehicle or accelerated vehicle retirement programmes).

2. What are the potential key social impacts of different climate change policy options?

- a) For each key potential social impact (bearing in mind Atkins' definition), we need to identify the policies that potentially have the (positive or negative) impact. Where impact is dependent on other factors (e.g. scope or stringency of policy, way in which investment is undertaken), these need to be identified clearly.
- b) Can any disproportionately negative affects be mitigated or positive ones be further maximized? If so, how?

The potential impacts of the above measures are that households drive fewer miles and buy vehicles with higher fuel efficiencies and lower emissions per mile. However, the resulting social impacts are affordability of transport and / or reduced accessibility to employment and services. Mitigation is possible and will depend on the specifics of the policy.

3. How will these impacts (positive or negative) differ between different social groups (distributional impacts)?

- a) Are there any disadvantaged groups or areas that may be particularly negatively or positively affected? If so, how?
- b) Can any disproportionately negative affects be mitigated or positive ones be further maximized? If so, how?
- c) To what extent is the impact dependent on the area in which the different social group live?

The household data showed that larger households appear to prefer larger cars. Less-educated, male, and older household heads also appear to choose larger vehicles. Households that live in larger cities are less likely to own larger vehicles. As predicted by the fuel efficiency regression, the operating cost per mile increases with size.

Newer vehicles are owned by households with higher total expenditures. Newer vehicles also appear to be preferred by households with more members above the age of 15, more income earners, and with white, male, and more-educated heads. Households with older heads seem more likely to own older vehicles. As indicated by the fuel efficiency regression, the operating cost per mile increases with vehicle age.

A tax on miles

The model concludes that a tax on miles is regressive only across upper income groups. This is because many lower income households do not own any vehicles and, in response to a price increase, poorer households reduce miles by more than do wealthy households. The greater degree of price-responsiveness on the part of low income households enhances the degree of progressivity in the lower-income groups and mitigates the degree of regressivity in the upper-income groups.

Engine size

Policies that implicitly tax engine size such as the gas-guzzler tax are likely to be significantly more regressive than taxes on miles (West, page 21). Gas-guzzler taxes increase the relative price of new vehicles that are large. The discrete choice estimates indicate that since the richer households purchase large new cars, these size taxes on new vehicles may be progressive. However, wealthy owners of new cars have a much higher disposable income than poor owners therefore size tax payments as a proportion of total expenditure are lower for rich households than for poor households and the size tax is therefore regressive.

Some policies promote size taxes to vehicles that have already been purchased. If fees were made higher for older, bigger cars, to reflect the fact that such vehicles pollute more per mile, the discrete choice estimates indicate that the burden may fall most heavily on middle-income households and be regressive across the upper half of the income distribution.

Newness subsidies

As expected, households with higher incomes prefer newer vehicles and newness subsidies would be regressive. The study indicates that a subsidy to newer cars would be significantly more regressive than a miles tax. Accelerated vehicle retirement programs, however, by paying poorer households to dispose of older vehicles, would be progressive (West page 18).

4. What key groups and /or geographical areas will be most affected (positively or negatively) by these different social impacts?
 - a) What is the likely impact of the policy measures that we have considered on people's travel behaviours?
 - b) Who and where will be most affected by these and how?

Low-income groups are most affected by all policies apart from the scrapage policy. The report states that in response to a tax on miles, poorer households reduce miles by more than do wealthy households and therefore the policy is progressive. However, the report does not describe that this might result in decreased accessibility. The other two policies will affect low-income groups via reduced affordability of transport.

5. How are public attitudes (including acceptability) likely to differ between social groups for both mandatory and voluntary options? How will take-up (and the barriers to take-up) of voluntary measures differ between groups?

Not covered by this report.

6. What will impact (in qualitative terms in absence of quantitative data) of policy options be on the
i) transport behaviours, and ii) CO₂ emissions, of different groups?

Not covered by this report.

7. What remaining gaps exist in the evidence base and how could these be filled?

Whether the price-responsiveness of the lower-income groups to these policies reduces their accessibility to employment and services to an unacceptable level.

Social and Distributional Impacts of Transport Climate Change Policies

Author(s)	Zia Wadud , Robert B. Noland and Daniel J Graham	Year of publication	2008
Title/publication	Equity analysis of personal tradable carbon permits for the road transport sector.		
Context			
	<i>Type of study e.g. literature review, survey</i>		
	<i>Geographic – country, region, city</i>		
	<i>Sample size (if relevant)</i>		

1. What climate change policies are we concerned with?

This paper looks at policy options for mitigating carbon emissions from personal road transport. The options mentioned are:

- A carbon tax for fuel
- A tradable permit policy

Wadud argues that to evaluate an emission control policy, it is important to examine three distinct components of the effects: efficiency, effectiveness and equity. While both policies are economically efficient and in theory would reduce carbon emissions by equivalent amounts, their key distinguishing feature is their distributional consequences (Wadud, Page 2).

A carbon tax is politically unpopular and the policy disproportionately burdens poor households. A tradable carbon permit, on the other hand, can provide a direct benefit to those groups (usually of lower economic status) who do not drive or drive below the allocated level of the permit (Wadud, Page 2).

2. What are the potential key social impacts of different climate change policy options?

- a) For each key potential social impact (bearing in mind Atkins’ definition), we need to identify the policies that potentially have the (positive or negative) impact. Where impact is dependent on other factors (e.g. scope or stringency of policy, way in which investment is undertaken), these need to be identified clearly.
- b) Can any disproportionately negative affects be mitigated or positive ones be further maximized? If so, how?

The key social impact of a tradable carbon permit is affordability as it might result in increased costs for vehicle users.

The distribution of burden depends on the permit allocation strategies and on the consumer response to an increase in price (Wadud, page 1). The behavioural response varies among different segments of the population depending on their travel needs, which in turn are contingent upon their income, location of residence and other factors.

A number of permit allocation options are possible:

1. Credits are distributed to all, on a per-capita basis
2. Credits are calculated on a per-capita basis, however they are distributed only to vehicle-owners. Non-vehicle owners’ credits are retained by government to recover administrative costs.
3. Credits are distributed to vehicle owners only, on a per-capita basis.
4. Credits are distributed to vehicle owners only, on a per-vehicle basis.

From an environmental justice point of view, an equal and free allocation to all is the most equitable option (Wadud, page 3).

3. How will these impacts (positive or negative) differ between different social groups (distributional impacts)?
 - a) Are there any disadvantaged groups or areas that may be particularly negatively or positively affected? If so, how?
 - b) Can any disproportionately negative affects be mitigated or positive ones be further maximized? If so, how?
 - c) To what extent is the impact dependent on the area in which the different social group live?

The progressivity of the policy depends on the permit allocation strategy. However, all four allocation strategies are relatively regressive between the highest two quintiles, but affecting the fourth income quintile with middle to upper middle class incomes, more than the wealthiest quintile (this is because the average income of the wealthiest group is pulled up because of large outliers).

Results show that an equal allocation to every individual makes the strategy regressive for the vehicle-owning households of the two lowest income quintiles. However, non-vehicle-owning households in the lowest quintile gain sufficiently from the free permits to make the strategy progressive overall (Wadud, page 10).

An equal allocation to every individual, with or without the government retaining the non-vehicle owners' permits, results in the same relative burden for vehicle-owning households.

4. What key groups and /or geographical areas will be most affected (positively or negatively) by these different social impacts?
 - a) What is the likely impact of the policy measures that we have considered on people's travel behaviours?
 - b) Who and where will be most affected by these and how?

This depends on the permit allocation method but non-vehicle owning households, which are usually the lower income classes, can be positively affected. Multi-vehicle owning households, usually the higher income groups, will be negatively affected. However, lower income groups with large cars can be negatively affected (depending on the permit allocation). This might result in reduced accessibility for them if they reduce travel or even sell their car.

5. How are public attitudes (including acceptability) likely to differ between social groups for both mandatory and voluntary options? How will take-up (and the barriers to take-up) of voluntary measures differ between groups?

Not covered by this report.

6. What will impact (in qualitative terms in absence of quantitative data) of policy options be on the i) transport behaviours, and ii) CO2 emissions, of different groups?

Not covered by this report.

7. What remaining gaps exist in the evidence base and how could these be filled?

Further research is required to understand the public and political acceptability of personal tradable permits (Wadud, p 12).

Social and Distributional Impacts of Transport Climate Change Policies

Author(s)	Christian Brand	Year of publication	2008
Title/publication	<i>Personal Carbon trading and Climate Change: Exploring Climate Change Emissions from Personal Travel Activity of Individuals and Households Germany: VDM Verlag Dr. Müller</i>		
Context			
	<i>Type of study e.g. literature review, survey</i>		
	<i>Geographic – country, region, city</i>		
	<i>Sample size (if relevant)</i>		

1. What climate change policies are we concerned with?

The book builds on the work of Anable et al (1997) to include the CO2 travel profiles of both urban and rural households in Oxfordshire and also includes all forms of transport, including air travel. It is targeted at two key policy agendas i) capping and trading of personal travel emissions through Personal Carbon Trading (PCT) ii) pricing CO2 through taxation by placing a social cost on carbon. More importantly for this study, the research focuses on a methodology for identifying and focusing reduction policies on the most polluting sub-groups of the population based on their activity patterns.

2. What are the potential key social impacts of different climate change policy options?

- a) For each key potential social impact (bearing in mind Atkins' definition), we need to identify the policies that potentially have the (positive or negative) impact. Where impact is dependent on other factors (e.g. scope or stringency of policy, way in which investment is undertaken), these need to be identified clearly.
- b) Can any disproportionately negative affects be mitigated or positive ones be further maximized? If so, how?

These are not really identified as the focus of the study is on reducing CO2.

3. How will these impacts (positive or negative) differ between different social groups (distributional impacts)?

- a) Are there any disadvantaged groups or areas that may be particularly negatively or positively affected? If so, how?
- b) Can any disproportionately negative affects be mitigated or positive ones be further maximized? If so, how?
- c) To what extent is the impact dependent on the area in which the different social group live?

As for the Anable et al study (1997), Brand identifies that it is a minority of travellers who account for the differences in emissions between high and low income quintiles. The highest emitters were responsible 61% of emissions for all travel (including air), whilst the lowest were responsible for less than 1% of the total. This is an important result because, in combination with the Anable study, it suggests that low emitters also do not travel by air, whereas the emissions of the highest emitters increase as a proportion of the total if air travel is included.

Emitters in the lower deciles were women, children and senior of 75 years plus, the not economically active, non- car drivers and people on incomes of less than £10k. Emitters i the highest group were more likely to earn £40k plus, be men in full-time employment (but the gender link is weaker than the income relationship), be 36-65 years of age and be in a single occupancy

household. Households with access to two cars or more produced 6 tonnes per person (i.e. 25%) more CO₂ per annum than the average for their sub-sample grouping.

Brand recommends that only the high emitters should be targeted by pricing policies, whilst PCT should be structured in such a way that low emitters benefit the most financially.

4. What key groups and /or geographical areas will be most affected (positively or negatively) by these different social impacts?
 - a) What is the likely impact of the policy measures that we have considered on people's travel behaviours?
 - b) Who and where will be most affected by these and how?

Not covered by the study

5. How are public attitudes (including acceptability) likely to differ between social groups for both mandatory and voluntary options? How will take-up (and the barriers to take-up) of voluntary measures differ between groups?

Not covered by the study

6. What will impact (in qualitative terms in absence of quantitative data) of policy options be on the i) transport behaviours, and ii) CO₂ emissions, of different groups?

This would depend entirely on price, individual and household circumstances, location and the alternative travel options that were available. The innovation of this study is that it suggests that the most could be achieved by targeting the highest emitters, especially air travellers, and that if such a strategy were adopted it would have a largely neutral effect on low income households and vulnerable social groups who are generally very low emitters.

7. What remaining gaps exist in the evidence base and how could these be filled?

Precisely how to design policies to target these high emitting groups.

Social and Distributional Impacts of Transport Climate Change Policies

Author(s)	Atkins Ltd for DfT	Year of publication	2009
Title/publication	Assessing Social and Distributional Impacts in Transport Scheme Appraisal and Evaluation		
Context			
	<i>Type of study e.g. literature review, survey</i>		
	<i>Geographic – country, region, city</i>		
	<i>Sample size (if relevant)</i>		

1. What climate change policies are we concerned with?

Neither this report nor the preceding report by UWE (2009) are concerned with policies, climate change-related or otherwise, rather they focus on identifying SDIs of relevance for the appraisal and evaluation of transport schemes. Atkins (2009) discusses how eight key SDIs could be included into the transport scheme appraisal process.

In spite of this, the review mentions some impacts in relation to selected policies, particularly the London congestion charge.

2. What are the potential key social impacts of different climate change policy options?

- a) For each key potential social impact (bearing in mind Atkins' definition), we need to identify the policies that potentially have the (positive or negative) impact. Where impact is dependent on other factors (e.g. scope or stringency of policy, way in which investment is undertaken), these need to be identified clearly.
- b) Can any disproportionately negative affects be mitigated or positive ones be further maximized? If so, how?

The study does not explicitly list the social impacts and distributional impacts separately, even though it explicitly defines the two impacts in a box on page 8. Instead, the report chooses to list eight key SDIs, some of which are arguably true SDIs, while others are arguably more social impacts. The social impacts in the eight SDIs are:

- a. Transport noise
- b. Poor air quality resulting from transport emissions
- c. Accessibility
- d. Severance
- e. Affordability
- f. User benefits
- g. Personal safety
- h. Safety

3. How will these impacts (positive or negative) differ between different social groups (distributional impacts)?

- a) Are there any disadvantaged groups or areas that may be particularly negatively or positively affected? If so, how?
- b) Can any disproportionately negative affects be mitigated or positive ones be further maximized? If so, how?

- c) To what extent is the impact dependent on the area in which the different social group live?

The report identifies a short-list of eight SDIs (which were identified as a result of a criteria analysis on a longer list that was in turn informed by a literature review), as follows:

- a. Distribution of noise
- b. Distribution of air quality
- c. Accessibility
- d. Severance
- e. Affordability or Financial impacts
- f. Distributions of user benefits
- g. Personal safety
- h. Safety

According to Atkins own definition occurs when social impacts vary by other variables. Distributional impacts are therefore those identified in the table below (based on summary in Section 2.10 and the longer description in Appendix A):

Social impact (implied ²)	Disadvantaged groups/areas affected (by transport schemes)													Benefits of scheme are not necessarily experienced			
	Lower income households	BME Groups	(Families with Children	Older people	Mobility impaired	Women	Young people	Rural communities	Medically vulnerable	Areas with affordable housing	Housing located close to employment	Those (living) near (re)developments or new	Softer modes (walkers and cyclists)		"Lone mothers"	"Housewives"	
Noise	X	X	X					X ³									X
Air quality	I*	I		D*					D	X	X						X
Accessibility	X		R*	R	X	R						U*			R		X
Severance																	
Affordability	X						X										
User benefits																	X
Personal safety		X		X		X	X										
Safety		X ⁴	X ⁵	X			X						X ⁴	X			
Other potential SDIs (not considered to be one of the key eight)																	
Landscape								X									
Physical fitness				X ⁶									X ³				
Regeneration												X					
Property values												X					

* I and D indicate cases of indirect and direct impacts, respectively, while R and U indicate rural and urban impacts
Note that green shading denotes positive as opposed to negative impacts.

Noise can also become a barrier for the community and therefore be a factor in severance.

Noise and air pollution impacts “tend to concentrate on certain vulnerable social groups” as these are more likely to live close to transport infrastructure (page 3).

² See point 2

³ Urban bypasses transfer noise and disturbance from urban to rural communities.

⁴ “Asian children” were found to be particularly impacted according to one study

⁵ Including fear of accidents

⁶ If walking (or cycling) opportunities reduced or limited by local environment.

For the London congestion charge the study reported the following SDIs:

- Some residents in neighbourhoods immediately outside of the charging zone felt that their “sense of safety” had deteriorated (page 54).
 - Little change in access for those within and outside of the charging zone (except for “social gatherings” which had been perceived to be reduced). This was in contrast to a study that considered potential SDIs resulting from a future road pricing in that public transport users and ethnic minorities considered that they would be losers from such a policy (all reported on page 55).
4. What key groups and /or geographical areas will be most affected (positively or negatively) by these different social impacts?
- a) What is the likely impact of the policy measures that we have considered on people’s travel behaviours?
 - b) Who and where will be most affected by these and how?
5. How are public attitudes (including acceptability) likely to differ between social groups for both mandatory and voluntary options? How will take-up (and the barriers to take-up) of voluntary measures differ between groups?

As noted above, the report noted that a study that considered potential SDIs resulting from a future road pricing in that public transport users and ethnic minorities considered that they would be losers from such a policy (page 55). Generally, though any evidence in relation to attitudes not mentioned.

6. What will impact (in qualitative terms in absence of quantitative data) of policy options be on the i) transport behaviours, and ii) CO2 emissions, of different groups?

Not covered by this report.

7. What remaining gaps exist in the evidence base and how could these be filled?

Report (Appendix A) states that there are the following evidence gaps:

- Understanding of impacts relating to range of modes, as most evidence relates to road schemes.
- Lack of evidence of downward pressures on property values of environmental impacts.
- General assumption in literature that increases inland and property values are good, with only a weak recognition that there may be losers amongst people who do not own properties or land. Evidence is needed on effects of transport schemes on specific groups in the property market.
- Little evidence of how “fear” of accidents may suppress travel, particularly walking and cycling
- Identifying/predicting psychological barriers with respect to severances and how much barriers are perceived compared to physically experienced
- Mental health effects of changes in transport infrastructure
- (at least in transport literature) the extent to which increasing density generates/reduces SDIs

Social and Distributional Impacts of Transport Climate Change Policies

Author(s)	Anable et al	Year of publication	2006
Title/publication	Review of public attitudes to climate change and transport, DfT report		
Context			
	<i>Type of study e.g. literature review, survey</i>		
	<i>Geographic – country, region, city</i>		
	<i>Sample size (if relevant)</i>		

1. What climate change policies are we concerned with?

The report indirectly discusses:

- Cleaner fuels and vehicles
- Pricing
- Energy/car labelling
- Travel awareness campaigns
- Travel plans
- Carbon neutral cities

2. What are the potential key social impacts of different climate change policy options?

- a) For each key potential social impact (bearing in mind Atkins' definition), we need to identify the policies that potentially have the (positive or negative) impact. Where impact is dependent on other factors (e.g. scope or stringency of policy, way in which investment is undertaken), these need to be identified clearly.
- b) Can any disproportionately negative affects be mitigated or positive ones be further maximized? If so, how?

The paper does not address social impacts.

3. How will these impacts (positive or negative) differ between different social groups (distributional impacts)?

- a) Are there any disadvantaged groups or areas that may be particularly negatively or positively affected? If so, how?
- b) Can any disproportionately negative affects be mitigated or positive ones be further maximized? If so, how?
- c) To what extent is the impact dependent on the area in which the different social group live?

The paper does not address distributional impacts.

4. What key groups and /or geographical areas will be most affected (positively or negatively) by these different social impacts?

- a) What is the likely impact of the policy measures that we have considered on people's travel behaviours?
- b) Who and where will be most affected by these and how?

5. How are public attitudes (including acceptability) likely to differ between social groups for both mandatory and voluntary options? How will take-up (and the barriers to take-up) of voluntary measures differ between groups?

The report discusses public attitudes to climate change in general, not by group. The objectives of the report were to improve the evidence base for policy decisions concerning:

- 1) How climate change knowledge and awareness relates to transport decision-making, attitudes and behaviours amongst the public.
- 2) The nature and impact of interventions aimed at altering attitudes and behaviours in relation to climate change issues
- 3) The identification of research methods (including measures and data sources) pertinent to these issues.

Summary re Objective 1: There is only a weak link between knowledge and awareness of climate change on the one hand and travel behaviour at the individual level on the other. Raising public awareness of this link is necessary, particularly to galvanise support for carbon abatement policy, but it is not sufficient to change behaviour on its own. In order to effect change, many other factors need to be addressed - at the objective and subjective and at the individual and collective levels. These factors will be different for different travel behaviours and for different people.

Summary re Objective 2: Transport policies can set out to change attitudes directly as a route to behaviour change, or they can be indirect in that they aim to change behaviour *first* without *necessarily* changing attitudes. This review concludes that a combination of each of these types of measures is desirable. In addition, any travel behaviour change strategy will be more effective if it targets change at the community level. Community Based Social Marketing offers a strategic framework to transform markets and behaviours.

Summary re Objective 3: There is a need to engage the public in issues of transport and climate change using deliberative methodologies to deviate from traditional 'top down' methods of information provision. New forms of research and communication need to be two-way, explore formats for learning on all sides of the issue, have an iterative and deliberative component and not necessarily strive to reach consensus.

6. What will impact (in qualitative terms in absence of quantitative data) of policy options be on the i) transport behaviours, and ii) CO₂ emissions, of different groups?

i) Not specifically covered by this report.

ii) Not specifically covered by this report.

7. What remaining gaps exist in the evidence base and how could these be filled?

Research recommendations mentioned in the report:

- Understanding how to engage with the public.
- Understanding the demand for air travel
- analysis of the media's impact
- Barriers to changing travel behaviour
- Examining the ways in which individuals view themselves in society with respect to different travel behaviours
- Segmentation
- Testing community based social marketing

- Trade-offs and policy acceptance
- Lifestyle

Social and Distributional Impacts of Transport Climate Change Policies

Author(s)	Jillian Anable, Brenda Boardman and Amanda Root	Year of publication	1997
Title/publication	Travel Emission Profiles Oxford: Energy and Environment Programme, Environmental Change Unit, Oxford University		
Context			
	<i>Type of study e.g. literature review, survey</i>		
	<i>Geographic – country, region, city</i>		
	<i>Sample size (if relevant)</i>		

1. What climate change policies are we concerned with?

The report presents the findings of a pilot study undertaken with residents in two villages rural Oxfordshire (Cholsey and Chalgrove) to identify breakdowns of average CO2 consumption and emission factors (travel emission profiles) between different social groups.

Public transport use in these both these villages is generally poor and car reliance is high. The study devoted a section of the household survey and used focus groups to assess people's attitudes to changing their travel patterns through a variety of measures, namely:

- Driving less, especially for shorter journeys
- Using public transport more
- Changing the location of their employment
- Switching to more fuel efficiency vehicles
- Providing more information about pollution and climate change

Only car transport was considered.

Only information provision and awareness-raising to effect reduced driving was considered in any detail.

2. What are the potential key social impacts of different climate change policy options?

- a) For each key potential social impact (bearing in mind Atkins' definition), we need to identify the policies that potentially have the (positive or negative) impact. Where impact is dependent on other factors (e.g. scope or stringency of policy, way in which investment is undertaken), these need to be identified clearly.
- b) Can any disproportionately negative affects be mitigated or positive ones be further maximized? If so, how?

This is not really covered in the report. However, it does identify that the top 10% of emitters in the sample emits 33% of all the CO2, whilst the bottom 10% emit only 1% and that income is the clearest indicator of these differential levels with the higher income households in the sample being responsible for four times the levels of emissions per capita to the lower income households. There is little variation in this across household size or for whether a household had children in it or not. Households with only one vehicle were also associated with lower than average emissions.

The measures that are suggested in the report to reduce their travel emissions profiles are largely voluntary and so it is implicitly assumed that people will not change their behaviours if there are adverse social effects for themselves or their families. Most participants in the focus groups felt that the distances they were currently driving were about right and stated

that they had already attempted to reduce short trips where possible. Lack of public transport was seen as a constraint on further change as was lack of reliable 'facts' about vehicle emissions.

3. How will these impacts (positive or negative) differ between different social groups (distributional impacts)?
 - a) Are there any disadvantaged groups or areas that may be particularly negatively or positively affected? If so, how?
 - b) Can any disproportionately negative affects be mitigated or positive ones be further maximized? If so, how?
 - c) To what extent is the impact dependent on the area in which the different social group live?

The study focuses on rural dwellers (settlement size under 3,000) as a particular under-represented and vulnerable group in terms of car use reduction strategies. It identifies that some people are more pre-disposed to receive information at different moments, but does not elaborate on this much. The report recommends that advice on reducing your CO2 profile could be given at energy advice centres or with the MOT test or as part of a fuel efficiency labelling scheme when cars are purchased. People should be told how they compare with the average emissions of others in their local area and social group (age, occupation, etc.) and how much better or worse their car performs compared to other vehicle types.

4. What key groups and /or geographical areas will be most affected (positively or negatively) by these different social impacts?
 - a) What is the likely impact of the policy measures that we have considered on people's travel behaviours?
 - b) Who and where will be most affected by these and how?

Not considered

5. How are public attitudes (including acceptability) likely to differ between social groups for both mandatory and voluntary options? How will take-up (and the barriers to take-up) of voluntary measures differ between groups?

Not really considered

6. What will impact (in qualitative terms in absence of quantitative data) of policy options be on the i) transport behaviours, and ii) CO2 emissions, of different groups?

Not considered

7. What remaining gaps exist in the evidence base and how could these be filled?

The report focuses on car travel only and so misses out the additional impact of air travel (see Brand, 2008). It also does not fully research the attitudes of different social groups to different policy measures.

Social and Distributional Impacts of Transport Climate Change Policies

Author(s)	Bayliss, D	Year of publication	2009
Title/publication	<i>Low Income Motoring in the UK London: RAC Foundation for Motoring</i>		
Context			
	<i>Type of study e.g. literature review, survey</i>		
	<i>Geographic – country, region, city</i>		
	<i>Sample size (if relevant)</i>		

1. What climate change policies are we concerned with?

The paper is broadly directed towards policies that will affect the motoring behaviours amongst of lower income households, but is mostly concerned with disaggregated analysis of the annual National Travel Survey (NTS) and Family Expenditure and Food Survey (EFS) data relating to this. It can help in an assessment of how many people might be affected by policies that are directed at reduced car use and are in particular trying to do this through increased pricing mechanisms.

2. What are the potential key social impacts of different climate change policy options?

- a) For each key potential social impact (bearing in mind Atkins' definition), we need to identify the policies that potentially have the (positive or negative) impact. Where impact is dependent on other factors (e.g. scope or stringency of policy, way in which investment is undertaken), these need to be identified clearly.
- b) Can any disproportionately negative affects be mitigated or positive ones be further maximized? If so, how?

The potential negative impacts are that lower income households (who already drive less than the average in terms of both their trips and journey distances) are at risk of exclusion through the reduce ability to use their cars and ensuing reduced accessibility to employment and other key activities and to goods and services. Mitigation is possible and will depend on the specifics of the policy.

The report identifies that people on low incomes with cars travel on average twice as much as their non-car owning counterparts but is still 38% less than the average for all car owning households. The reason for this is fewer and shorter car journeys and less travel by rail.

Bus and rail usage by car owning low income households is about half of that of low income non-car owning households, walking and cycling about a third less but taxi use is significantly greater by this group.

Low income car owners spend 55% less on buying and maintaining their cars, 46% less on fuel and 38% less on insurance than the average. A slightly higher proportion of their outgoings is spent on motoring –17 and 16% of expenditure is attributed to motoring costs in the lowest and second income quintiles respectively compared with 15%, 14% and 16% in the next three quintiles.

3. How will these impacts (positive or negative) differ between different social groups (distributional impacts)?

- a) Are there any disadvantaged groups or areas that may be particularly negatively or positively affected? If so, how?

- b) Can any disproportionately negative affects be mitigated or positive ones be further maximized? If so, how?
- c) To what extent is the impact dependent on the area in which the different social group live?

Whilst focusing specifically on the driving behaviours of low income households, the report also offers break down analyses of this by:

- Family type
- Tenure
- Ethnicity
- Health related travel difficulties
- Income
- Access difficulties to key services (local shop, supermarket, post office, doctor's surgery and hospital)
- Adult car access and by ethnicity, family type
- Annual trip rates
- Annual distances travelled

Household expenditure on transport and motoring data from the EFS is also considered:

- Overall average increases by households 1974-2008
- All transport spending by car owning households only by income 2007
- Expenditure on motoring only by car owning households only by income 2007
- Car engines size by income
- Car age by income
- Car running costs by income
- Expenditure on transport by non-car owning households by income
- Percentage of expenditure by car owning households on motoring taxes by income

4. What key groups and /or geographical areas will be most affected (positively or negatively) by these different social impacts?
 - a) What is the likely impact of the policy measures that we have considered on people's travel behaviours?
 - b) Who and where will be most affected by these and how?

The report identifies that the make-up of low income households differ from the average in that they are more likely to be:

- Lone parent families and pensioners
- Live in council or housing association accommodation
- Be Pakistani, Bangladeshi or Black
- Be in service sector, catering or agricultural occupations
- Live in Wales, Scotland or the North of England
- Include a higher number of disabled people

However, terms of absolute numbers four fifths of low income households are comprised of:

- Couples with children, single parents without children, single parents and pensioner couples;
- White families
- People living in owned council and mortgaged houses

5. How are public attitudes (including acceptability) likely to differ between social groups for both mandatory and voluntary options? How will take-up (and the barriers to take-up) of voluntary measures differ between groups?

Not covered by this report

6. What will impact (in qualitative terms in absence of quantitative data) of policy options be on the i) transport behaviours, and ii) CO2 emissions, of different groups?

Not covered by this report.

7. What remaining gaps exist in the evidence base and how could these be filled?

Attitudes transport by income and attitudes to climate change policies by income and the inclusion and accessibility differences between car owning and non-car owning low income households.

Social and Distributional Impacts of Transport Climate Change Policies

Author(s)	T Litman	Year of publication	2009
Title/publication	Evaluating Transportation Affordability		
Context			
	<i>Type of study e.g. literature review, survey</i>		
	<i>Geographic – country, region, city</i>		
	<i>Sample size (if relevant)</i>		

1. What climate change policies are we concerned with?

This paper considers the affordability of transport, its importance to society, how to evaluate it for transport planning and practical ways to improve it. Policies include improving the quantity and quality of affordable transportation options, and by improving land use accessibility to reduce travel distances.

2. What are the potential key social impacts of different climate change policy options?

- a) For each key potential social impact (bearing in mind Atkins' definition), we need to identify the policies that potentially have the (positive or negative) impact. Where impact is dependent on other factors (e.g. scope or stringency of policy, way in which investment is undertaken), these need to be identified clearly.
- b) Can any disproportionately negative affects be mitigated or positive ones be further maximized? If so, how?

The use of transport affordability policies potentially has the following social impacts:

- Accessibility
- Severance
- Affordability

3. How will these impacts (positive or negative) differ between different social groups (distributional impacts)?

- a) Are there any disadvantaged groups or areas that may be particularly negatively or positively affected? If so, how?
- b) Can any disproportionately negative affects be mitigated or positive ones be further maximized? If so, how?
- c) To what extent is the impact dependent on the area in which the different social group live?

The impacts can differ greatly between the social groups. Where transport affordability is low, then the groups most likely to be affected (negatively) include lower-income households, those seeking employment or trying to access education, the elderly, and disabled adults. However, a wide range of factors relating to the strategies employed to increase transport affordability will determine which social groups are subsequently positively affected.

The land use patterns within an area have a large impact on transport affordability. Where smart growth methods are used, less mobility is required to reach activities and destinations and more travel options serve common destinations, increasing transport affordability for a variety of social groups, including those without access to a private vehicle. Where the variety of services within a neighbourhood or worksite are improved and travel options from the home to worksite are improved, accessibility and hence affordability are often also improved.

The range of transportation options available also has a direct link to transport affordability. Through increasing the quantity and quality of transport modes/services available, affordability of transport is also increased, benefiting a wider range of social groups.

Transport costs can be reduced, which may increase transport affordability, including vehicle purchase costs and fees, vehicle insurance costs and fees, fuel prices, road tolls and parking fees, transit and taxi fares, and telecommunications and delivery services. Public transport orientated developments can reduce total household transportation costs.

The paper discusses a wide range of strategies that can be used to increase transport affordability. These are summarised below.

Transport affordability improvement strategies can include the following:

- Non-motorised transportation improvements
- Ride sharing
- School trip management
- Teleporting
- Public transport improvements
- Bike / public transport integration
- Mobility management marketing
- Addressing security concerns (e.g. associated with the use of cycling, walking, public transport)

Strategies that can increase the affordability of transport services include:

- Commuter financial incentives
- Commute trip reduction programmes
- Public transport and rideshare subsidies
- Location efficient development.

Strategies to improve accessibility:

- Smart growth
- Addressing security concerns (e.g., associated with certain neighbourhoods or the use of certain modes of transport)

4. What key groups and /or geographical areas will be most affected (positively or negatively) by these different social impacts?
 - a) What is the likely impact of the policy measures that we have considered on people's travel behaviours?
 - b) Who and where will be most affected by these and how?

Transport affordability can be influenced by a number of factors, and therefore affects a variety of social groups. Accessibility-based planning includes transport affordability improvement strategies such as alternative modes (walking, cycling, car sharing and accessible areas) and location efficient development (locating affordable housing in accessible areas). However, where mobility is the focus, transportation is often assumed to mean car travel (which therefore means that affordability has to be achieved through subsidising car travel). Trade-offs are often experienced between accessibility and mobility, such as more accessible homes often cost more, while cheaper housing is often in urban fringe locations with relatively high transport costs. Choosing accessibility rather than mobility is therefore likely to have more positive effects for a wider range of social groups (less vulnerable to risk of vehicle failure, loss of driving ability and increased fuel prices; less

dependency on driving members of the family; increased household physical activity associated with alternative mode use; and reduced external costs for society, such as congestion, road and parking costs, accidents and pollution).

The needs and abilities of individuals also has a significant effect on affordability of transport. Those who are employed, responsible for caregiving or who have physical and mental disabilities may be unable to use affordable transport options (such as walking, cycling, public transport etc) and restricted to personal transport modes, which may remain unaffordable.

5. How are public attitudes (including acceptability) likely to differ between social groups for both mandatory and voluntary options? How will take-up (and the barriers to take-up) of voluntary measures differ between groups?

Not specifically discussed within the paper.

6. What will impact (in qualitative terms in absence of quantitative data) of policy options be on the i) transport behaviours, and ii) CO₂ emissions, of different groups?

i) Individuals may travel less and not access services or activities that they wish to where transport is not affordable. This is likely to have knock-on effects for a variety of social groups in terms of access to employment, education, key services (younger people, the elderly, low income households, unemployed, mobility impaired). The situation for these groups can therefore be improved through the use of transport affordability strategies which aim to increase accessibility, through a combination of increased transport choice/quality, and effective land use planning.

ii) Not specifically covered by this report.

7. What remaining gaps exist in the evidence base and how could these be filled?

Social and Distributional Impacts of Transport Climate Change Policies

Author(s)	Litman, T	Year of publication	2007
Title/publication	Evaluating Transportation Equity: Guidance for incorporating distributional impacts in transportation planning, Victoria Transport policy Institute, Canada.		
Context			
	<i>Type of study e.g. literature review, survey</i>		
	<i>Geographic – country, region, city</i>		
	<i>Sample size (if relevant)</i>		

1. What climate change policies are we concerned with?

This paper provides guidance on incorporating equity impacts into transportation planning.

2. What are the potential key social impacts of different climate change policy options?

- a) For each key potential social impact (bearing in mind Atkins' definition), we need to identify the policies that potentially have the (positive or negative) impact. Where impact is dependent on other factors (e.g. scope or stringency of policy, way in which investment is undertaken), these need to be identified clearly.
- b) Can any disproportionately negative affects be mitigated or positive ones be further maximized? If so, how?

The use of transport policies potentially has the following social impacts related to equity:

- Distribution of noise
- Distribution of air quality
- Accessibility
- Severance
- Affordability
- Distribution of user benefits
- Personal safety
- Safety

3. How will these impacts (positive or negative) differ between different social groups (distributional impacts)?

- a) Are there any disadvantaged groups or areas that may be particularly negatively or positively affected? If so, how?
- b) Can any disproportionately negative affects be mitigated or positive ones be further maximized? If so, how?
- c) To what extent is the impact dependent on the area in which the different social group live?

Three types of transport equity that can affect different social groups:

- Horizontal equity is concerned with the distribution of impacts between individuals and groups considered equal in ability and need (policies should therefore avoid favouring one individual or group over others):
 - Equal treatment
 - Equal allocation of funds and other resources
 - Equal use of public facilities
 - Cost recovery

- Vertical equity is concerned with the distribution of impacts between individuals and groups that differ in abilities and needs, including income and social class (efforts can be made to ensure that disadvantaged groups do not bear an excessive share of external costs, including pollution, accident risk, financial costs etc):
 - Transport affordability
 - Housing affordability
 - Discounts for low income travellers
 - Impacts on low income communities
 - Employment opportunities
 - Quality of service for lower income travellers.
- Vertical equity with respect to mobility needs and ability (ability that transport system meets the needs of travellers with special constraints):
 - Universal design
 - Special mobility services
 - Disabled parking policies
 - Quality of services for non-drivers

The key factors that can contribute to transport disadvantaged status, and therefore experience equity issues, include low incomes, non-drivers/carless, people with disabilities, language barriers, isolation (in an inaccessible location), caregivers (responsible for a dependent child or disabled adult) and other obligations (such as require frequent medical treatments, attend school or is employed).

4. What key groups and /or geographical areas will be most affected (positively or negatively) by these different social impacts?
- a) What is the likely impact of the policy measures that we have considered on people's travel behaviours?
 - b) Who and where will be most affected by these and how?

Transport equity is likely to affect a wide range of key groups and in very different ways. These can include age, gender, race, ethnicity, status and lifecycle stage (see question 3). Equity issues linked to transport schemes can include those relating to affordability of transport options, availability of transport options, accessibility of transport options, and the potentially negative effects that transport schemes may have. The range of external impacts of transport which are likely to have equity impacts, include traffic congestion and crash risk, pollution emissions, severance, aesthetic impacts (landscape/townscape), land use impacts and community cohesion.

5. How are public attitudes (including acceptability) likely to differ between social groups for both mandatory and voluntary options? How will take-up (and the barriers to take-up) of voluntary measures differ between groups?

Not specifically discussed within the paper.

6. What will impact (in qualitative terms in absence of quantitative data) of policy options be on the i) transport behaviours, and ii) CO₂ emissions, of different groups?

i) Where costs and affordability of transport options are an issue (including fares, taxes, vehicle purchase and running costs etc) this can affect travel behaviour through not being able to make certain trips (which in turn can affect accessibility to key services and activities). Transport service quality, including modes available and land use accessibility are likely to directly affect accessibility of key services and activities for selected key groups, including

issues such as physical ability to use transport modes, suitability of timetabling to access desired key services and accessibility etc.

ii) Not specifically covered by this report.

7. What remaining gaps exist in the evidence base and how could these be filled?

Author(s)	Lucas, K, Grosvenor, T, Simpson, R	Year of publication	2001
Title/publication	<i>Transport, the environment and social exclusion</i>		
Context			
	<i>Type of study e.g. literature review, survey</i>		
	<i>Geographic – country, region, city</i>		
	<i>Sample size (if relevant)</i>		

1. What climate change policies are we concerned with?

None, although congestion charging is mentioned. The report concentrates on identifying the negative effects of poor access to transport and the transport policy measures that will most improve the lives of non-car owning individuals in these groups from their own perspectives. The following were identified as the most important issues that need addressing:

- More local facilities such as shops, community facilities, GPs and secondary schools
- Improved public transport services, especially to key employment locations, out-of-town shopping centres, hospitals and colleges and in the evening and weekends
- Reduced public transport costs and better targeted travel subsidies, especially lower cost or free travel for children going to school
- Better information about the transport that is available, especially for people with low literacy skills, no web-based access available to them, English as a second language speakers and blind or partially sighted travellers (the Minicom system was considered to be very good by the deaf people in the study).

2. What are the potential key social impacts of different climate change policy options?

- a) For each key potential social impact (bearing in mind Atkins' definition), we need to identify the policies that potentially have the (positive or negative) impact. Where impact is dependent on other factors (e.g. scope or stringency of policy, way in which investment is undertaken), these need to be identified clearly.
- b) Can any disproportionately negative affects be mitigated or positive ones be further maximized? If so, how?

The report identifies that lack of transport already prevents people from participating in important life opportunities and that anything which makes this less affordable will impact negatively on their already beleaguered circumstances. Pedestrian safety and fear of crime and traffic noise were also all identified as important issues, less so air pollution and nobody discussed climate change but this was largely an unknown public agenda in 1999 when the study was conducted.

3. How will these impacts (positive or negative) differ between different social groups (distributional impacts)?

- a) Are there any disadvantaged groups or areas that may be particularly negatively or positively affected? If so, how?
- b) Can any disproportionately negative affects be mitigated or positive ones be further maximized? If so, how?
- c) To what extent is the impact dependent on the area in which the different social group live?

As above

4. What key groups and /or geographical areas will be most affected (positively or negatively) by these different social impacts?
 - a) What is the likely impact of the policy measures that we have considered on people's travel behaviours?
 - b) Who and where will be most affected by these and how?

The report identifies the following groups as being currently disadvantaged by transport policy, but this is not an exhaustive list

- i. Primary school children
 - ii. Young people 16-25
 - iii. Unemployed (men)
 - iv. Low income shift workers (women)
 - v. People with physical disabilities
 - vi. Minority ethnic groups (Yemeni & Chinese)
 - vii. Older people
 - viii. Poor people living in affluent communities
 - ix. People on low incomes in rural areas
5. How are public attitudes (including acceptability) likely to differ between social groups for both mandatory and voluntary options? How will take-up (and the barriers to take-up) of voluntary measures differ between groups?

It was clear that any public information needed to be paper-based and readily available in the places where people regularly visit e.g. the GP surgery, the community centre, the benefit office, the local pub, the post office and in cultural activity centres, churches and mosques for faith based groups. A trusted interpreter of this information is often needed. Skills-training is also often a pre-requisite for some people in these groups, who may have low cognitive abilities. Issues of trust are often key with many of these groups, who can be scrutiny and adverse to change.

Almost everyone in the groups aspired to car ownership, except for the older people's group. It is also worth noting that in the two Bristol groups the non-car owners were as adverse to the idea of town centre congestion charging as the affluent car drivers, seeing this as just another way for the local authority to get money out of them. They did not feel that they would benefit from the proposed light rail scheme that the council was promoting and intending to fund from the hypothecated monies.

6. What will impact (in qualitative terms in absence of quantitative data) of policy options be on the i) transport behaviours, and ii) CO2 emissions, of different groups?

Pricing measures may serve to further exclude already transport poor groups. Measures that significantly reduce local traffic in deprived areas would significantly improve quality of life.

7. What remaining gaps exist in the evidence base and how could these be filled?

Evidence of the geographic extent, location and intensity of the problems identified across the UK as a whole.

Social and Distributional Impacts of Transport Climate Change Policies

Author(s)	Parkhurst, G., and Shergold, I	Year of publication	2009
Title/publication	<i>Literature Review – The Treatment of Social and Distributional Impacts in Appraisal Evaluation – Final Report, University of the West of England, UK.</i>		
Context			
	<i>Type of study e.g. literature review, survey</i>		
	<i>Geographic – country, region, city</i>		
	<i>Sample size (if relevant)</i>		

1. What climate change policies are we concerned with?

The report is not specifically concerned with climate change policies. However, the study has the following objectives linked to transport schemes and their SDIs:

- *To understand how to better take social and distributional impacts into account in the development of transport scheme design and appraisal;*
- *To examine how evidence from social research can best be integrated into appraisal so that it is given appropriate weight in decision-making; and*
- *To identify the implications that any proposed approach(es) for better taking social and distributional impacts into account in appraisal may have for subsequent post-implementation transport scheme evaluation.*

2. What are the potential key social impacts of different climate change policy options?

- a) For each key potential social impact (bearing in mind Atkins' definition), we need to identify the policies that potentially have the (positive or negative) impact. Where impact is dependent on other factors (e.g. scope or stringency of policy, way in which investment is undertaken), these need to be identified clearly.
- b) Can any disproportionately negative affects be mitigated or positive ones be further maximized? If so, how?

Transport schemes potentially have the following social and distributional impacts:

- Distribution of noise
- Distribution of air quality
- Accessibility
- Severance
- Affordability
- Distribution of user benefits
- Personal safety
- Safety

3. How will these impacts (positive or negative) differ between different social groups (distributional impacts)?

- a) Are there any disadvantaged groups or areas that may be particularly negatively or positively affected? If so, how?
- b) Can any disproportionately negative affects be mitigated or positive ones be further maximized? If so, how?

- c) To what extent is the impact dependent on the area in which the different social group live?

SDIs are the 'social' effects on individuals and communities arising from transport schemes – for example changes affecting an individual's mobility, or a community's ability to access services such as healthcare. They are distinct from the economic and environmental consequences of a transport intervention, although there is overlap between the categories (Parkhurst page 6).

This literature review considers the SDIs of transport schemes in the context of the NATA 5 framework objectives of environment, economy, safety, accessibility and integration. The key findings, which identify the key disadvantaged groups and likely impacts, are summarised below.

Environment

Noise:

- The SDIs arise from differential exposure by groups of different age and spatial location.
- Specific health issues have been identified for children.
- Noise disturbance (linked to traffic levels) also affects physical and social activity levels on and around streets.

Air quality:

- Direct SDIs can be identified for groups defined by medical vulnerability and age, but also indirect relationships with income and ethnicity.
- In the case of noise pollution, there is a spatial element to exposure, with more affordable housing often being found in areas with higher levels of air pollution.
- Groups with the highest levels of exposure (often transport derived) are also often those who benefit least from the high levels of mobility brought by private cars.

Landscape and townscape:

- Rural areas are likely to be subject to negative impacts on the landscape from transport schemes, particularly to tranquillity.
- Social benefits can often be gained in more built up areas linked to transport improvements – it has been found that communities can benefit from an enhanced sense of place following from a high-quality redevelopment, which can potentially create opportunities for more physical and social activity.

Physical fitness:

- SDIs relate to age, since older people are the group that benefits most from increasing activity levels by walking more (and conversely then suffers most if walking levels are suppressed by external factors).
- More potential to enhance physical fitness effectively is seen to lie in encouraging cycling, which indicates that groups for whom cycling is out of reach might be disadvantaged.
- An unintended side effect of improved public transport is that it may reduce the propensity to walk or cycle.

Economy

Travel costs:

- Low income groups are likely to be negatively affected due to increase in public transport costs since 1985 and that they are likely to spend a much higher proportion of household budget on transport than wealthier households.
- Younger people may also be adversely affected, as they are likely to have low incomes (although they often come from wealthier households), which can subsequently inhibit journeys (including those to education and training opportunities).

Regeneration:

- City centres may benefit more than inner city and suburban areas, implying that disadvantaged groups in inner city locations might not be obvious beneficiaries.
- However, evidence from the Jubilee Line Extension showed that regeneration has occurred, with positive SDIs for the communities along the route. However, it is noted that economic activity has probably been re-distributed in London, implying other areas may have suffered negative impacts.

Property values:

- Gentrification can enhance property values, creating benefits for property owners, possibly at the expense of property renters.
- Taxation may be required to recover transfers to landowners due to infrastructure improvements.

Safety

Collision risk:

- Pedestrians, cyclists and motorcyclists are identified as being the most vulnerable mode-based groups and the young and old being vulnerable age groups.
- Ethnicity is also factor in explaining incidence of collisions.
- There are SDIs amongst children according to socio-economic group and presence of a lone mothers or two parents in the household, with the casualty rate for the latter being half that of the former.
- Fear of being involved in an accident can be a factor in suppressing travel, with cyclists and children being two specifically identified groups.

Personal security:

- Fear for personal security can lead to particular groups being deterred from making trips or making trips by a specific mode, due to their actual or perceived vulnerability.
- Vulnerable groups include the young, the old, women and ethnic minorities.
- These groups are also likely to be disadvantaged in terms of increases in car use costs (assuming they have access to one), where public transport is seen to be a particularly unacceptable alternative, for cultural reasons.

Accessibility

Rural Effects:

- In rural areas, access to health care, education and employment are of key concern.
- Children, older persons and housewives and women are identified as vulnerable groups.
- Positive examples of accessibility being enhanced through the use of public transport applications were reviewed, confirming the importance of buses in particular in addressing some needs.

Urban Effects:

- Evidence from studies show conflicting results with some showing times and increased rate of travel by older persons while others showed a low level of benefits experienced by long-standing residents.

Severance:

- Evidence is not quite clear - debate as to how far communities 'recover' from severance, and adapt to the new circumstances, and how far the effects have health as well as quality of life impacts.
- Similarly, there is a debate as to how far severance is experienced as a physical or psychological barrier, and whether barriers are always negative since they can also provide 'definition' to communities.

Integration

Additional interchanges, this may not be welcomed by all, as there is a time and effort penalty to changing modes.

Other

Population Migration:

- Migration was seen to change the character of some areas, and also led to changes in the services and facilities available.

Wider economic factors:

- Wider economic circumstances are likely to be instrumental in the level of SDIs that were affecting communities.

The young and the old are particularly vulnerable for environment and safety issues. Children, elderly people and women in rural areas are vulnerable to accessibility issues.

4. What key groups and /or geographical areas will be most affected (positively or negatively) by these different social impacts?
 - a) What is the likely impact of the policy measures that we have considered on people's travel behaviours?
 - b) Who and where will be most affected by these and how?

Transport schemes, their availability, type and location can have a wide range of impacts on a large number of key groups, the majority of which have been explored above. This includes potential impacts on travel behaviour.

5. How are public attitudes (including acceptability) likely to differ between social groups for both mandatory and voluntary options? How will take-up (and the barriers to take-up) of voluntary measures differ between groups?

Not covered by this report.

6. What will impact (in qualitative terms in absence of quantitative data) of policy options be on the i) transport behaviours, and ii) CO2 emissions, of different groups?

- i) See question 3 above.
- ii) Not covered by this report.

7. What remaining gaps exist in the evidence base and how could these be filled?

The literature review identifies a number of gaps in the evidence base that could be explored further through research, including the following:

- An increased understanding of environmental impacts created by the full range of transport modes is required, as most of the current evidence refers to road schemes.
- More information is needed about impacts on property values of environmental effects from transport schemes and the impacts that this could have on key groups.
- Evidence is needed on the effects of transport schemes on specific groups in the property market.
- More research is required into how 'fear' of accidents may suppress travel by modes such as walking and cycling.
- More research is required relating to identifying or predicting psychological barriers in respect of severance, and the extent to which segregation mechanisms are perceived rather than physically experienced.
- The mental health effects of changes in transport infrastructure need more research.
- An evidence gap exists around the extent to which increasing density generates or reduces SDIs.

Author(s)	John Preston and Fiona Raje	Year of publication	2007
Title/publication	Accessibility, mobility and transport-related social exclusion		
Context			
	<i>Type of study e.g. literature review, survey</i>		
	<i>Geographic – country, region, city</i>		
	<i>Sample size (if relevant)</i>		

1. What climate change policies are we concerned with?

The paper is not really with climate change policy but with accessibility and how reduced access affects economic and social participation. It particularly serves to highlight that social disadvantage is often not highly spatially aggregated.

2. What are the potential key social impacts of different climate change policy options?

- a) For each key potential social impact (bearing in mind Atkins' definition), we need to identify the policies that potentially have the (positive or negative) impact. Where impact is dependent on other factors (e.g. scope or stringency of policy, way in which investment is undertaken), these need to be identified clearly.
- b) Can any disproportionately negative affects be mitigated or positive ones be further maximized? If so, how?

The authors identify that not all deprived groups will experience transport problem and that their exclusion may be solely the result of familial and social contacts. Social exclusion is seen as the result not of a lack of social opportunities but the inability to get to these. Facilities/contacts are split into proximate facilities/contacts in which transport times and costs are immaterial and more distant facilities/contacts where transport becomes a factor. The authors suggest 5 key policy responses to transport-related social exclusion:

- i) Reduce transport costs (and times) and hence promote physical mobility (and accessibility). This may be seen as promoting exchange entitlements, as cheap and fast transport permits proximate contacts to be exchanged for distant contacts.
- ii) Increase social contacts through information technology, by promoting virtual mobility (see also Kenyon et al., 2002). This may also be seen as promoting exchange entitlements.
- iii) Increase proximate facilities and contacts by, for example, decentralising facilities and hence promoting accessibility through land-use measures. This may be seen as promoting production entitlements, as this increases the number of proximate contacts.
- iv) Increase incomes so that transport budget constraints no longer apply, hence promoting mobility. This might be achieved through promoting endowment and transfer entitlements
- v) Increase proximate contacts by pro-family/pro-neighbourliness policies. This may also be seen as promoting production entitlements.

Clearly, not all of these relate to the proposed climate change reduction measures for transport but i), ii), iii) are all highly relevant to this debate.

3. How will these impacts (positive or negative) differ between different social groups (distributional impacts)?

- a) Are there any disadvantaged groups or areas that may be particularly negatively or positively affected? If so, how?
- b) Can any disproportionately negative affects be mitigated or positive ones be further maximized? If so, how?
- c) To what extent is the impact dependent on the area in which the different social group live?

The paper identifies three criteria that the authors consider useful in identifying the degree of transport-related social exclusion and highlighting appropriate policy to this:

- Level of travel in the area as a whole (area mobility),
- Level of travel made by particular individuals or groups (individual mobility)
- Overall accessibility of the area.

Each of these three criteria can take two levels (high and low), 8 categories as follows:

- 1) High Area Mobility, High Personal Mobility, High Accessibility.
- 2) High Area Mobility, Low Personal Mobility, High Accessibility.
- 3) Low Area Mobility, Low Personal Mobility, High Accessibility.
- 4) Low Area Mobility, High Personal Mobility, High Accessibility
- 5) Low Area Mobility, Low Individual Mobility, Low Accessibility
- 6) Low Area Mobility, High Individual Mobility, Low Accessibility
- 7) High Area Mobility, High Individual Mobility, Low Accessibility
- 8) High Area Mobility, Low Individual Mobility, Low Accessibility

4. What key groups and /or geographical areas will be most affected (positively or negatively) by these different social impacts?
 - a) What is the likely impact of the policy measures that we have considered on people's travel behaviours?
 - b) Who and where will be most affected by these and how?

This is not covered in any great detail but the paper does discuss the need for different types of policy solutions to suit different disadvantaged groups in different circumstances and also emphasises that a highly localised level of intervention is best suited to any mitigation measures. So for example, in the 8 corresponding study areas they looked at in Bristol, Nottingham and Oxford:

- 1) **Congestion Charging** was recommended as the best policy approach in the High Area Mobility, High Personal Mobility, High Accessibility of Lenton Nottingham;
- 2) **Cultural and informational barriers for bus provision** was identified in relation to the Asian populated parts of the same Lenton area - the High Area Mobility, Low Personal Mobility, High Accessibility category;
- 3) **Upgrades to the bus system, information provision, ticketing and re-routing, demand responsive transit and taxi sharing with respect to access to health care facilities** was recommended in the Low Area Mobility, Low Personal Mobility, High Accessibility area of the Barton Estate in Oxford.
- 4) **Charging mechanisms** were also recommended for the minority of car owners on the same estate who were described as falling into the Low Area Mobility, High Personal Mobility, High Accessibility area
- 5) **Extending the City's tram network to the estate, possibly funded by a workplace parking levy, buses, demand responsive transport and taxis** were recommended for the Low Area Mobility, Low Individual Mobility, Low Accessibility residents of Clifton in Nottingham
- 6) **Traffic calming measures** were recommended in relation to the high levels of mobility identified for young male moped users in the Low Area Mobility, High Individual Mobility, Low Accessibility category on the Hartcliffe estate in Bristol

- 7) **Charging for access to the central city and the trunk road network was recommended for the** high-income residents of the relatively isolated west Oxfordshire small town of Charlbury, who were described as falling in the High Area Mobility, High Individual Mobility, Low Accessibility area
 - 8) **No specific policy measures** were stated in the High Area Mobility, Low Individual Mobility, Low Accessibility area of same Charlbury area, but it was felt that the **Home Zone scheme here had been inappropriate** and that **low income local residents in this area would be heavily adversely affected by any charging schemes.**
5. How are public attitudes (including acceptability) likely to differ between social groups for both mandatory and voluntary options? How will take-up (and the barriers to take-up) of voluntary measures differ between groups?

Not covered by this paper

6. What will impact (in qualitative terms in absence of quantitative data) of policy options be on the i) transport behaviours, and ii) CO2 emissions, of different groups?

See above

7. What remaining gaps exist in the evidence base and how could these be filled?

Very localised (Super Output area size) area-based analyses of accessibility to local facilities services and public transport would be needed to establish which areas fell into each category and then precise socio-demographic information on the residents of these areas and their levels of car access would be needed to be matched to this data. It is worth noting that the authors feel that the DfT Accession model is incapable of such fine detailed analysis, although this is perhaps not necessarily the case should the skills and data be available for this.

Author(s)	Noel Smith, Jacqueline Beekhelling, Antonia Ivaldi, Karen Kellard, Adriana Sandu, and Carolyn Tarrant	Year of publication	2006
Title/publication	Evidence Base Review on Mobility - Choices and Barriers for Different Social Groups		
Context			
	<i>Type of study e.g. literature review, survey</i>		
	<i>Geographic – country, region, city</i>		
	<i>Sample size (if relevant)</i>		

1. What climate change policies are we concerned with?

None specifically – this report is concerned with the travel needs and attitudes to transport of different social groups

2. What are the potential key social impacts of different climate change policy options?

- a) For each key potential social impact (bearing in mind Atkins' definition), we need to identify the policies that potentially have the (positive or negative) impact. Where impact is dependent on other factors (e.g. scope or stringency of policy, way in which investment is undertaken), these need to be identified clearly.
- b) Can any disproportionately negative affects be mitigated or positive ones be further maximized? If so, how?

3. How will these impacts (positive or negative) differ between different social groups (distributional impacts)?

- a) Are there any disadvantaged groups or areas that may be particularly negatively or positively affected? If so, how?
 - b) Can any disproportionately negative affects be mitigated or positive ones be further maximized? If so, how?
 - c) To what extent is the impact dependent on the area in which the different social group live?
- **Adults on low income** are less likely to have access to private vehicles and more likely to be dependent on - and vulnerable to problems with - local public transport. The costs of public transport can be a particular difficulty for people on low income, though lack of available, adequate services are a greater obstacle.
 - **Adults from black and minority ethnic groups** are more likely to depend on public transport than white adults. Public transport planning in the UK has not necessarily kept pace with changing local communities, leaving some of the needs of black and minority ethnic groups unmet. Moreover, for some of these adults, fear from racial attacks on public transport can represent a key obstacle to mobility.
 - **Gender** constitutes another critical dimension of the diversity of travel needs and experiences among adults. Men are more likely to travel for work purposes than women, while women are more likely to take social and personal business journeys (including escorting children to school). Women are less likely to have access to a car, and more likely to travel by bus, foot or taxi than are men, arguably reflecting men's use of the car to travel to work. Women are more likely than men to be responsible for childcare. As such they face specific difficulties associated co-ordinating these responsibilities with work (for example, escorting

children to school and travelling to work), and with travelling with children on public transport, including problems boarding and alighting, and experiencing unreliable services. Bus routes often do not meet women's needs to travel off-peak, and on non-radial routes. Additionally, women are more likely than men to have fears about personal security.

- **Adults in rural areas** are more likely to own and use private transport than those in urban areas. For many in rural areas, the limited provision of public transport means that car-ownership is crucial and unavoidable in order to access everyday opportunities and services.
- **People with disabilities** are less likely to drive and more likely to be dependent on public or community transport, or lifts from family and friends. Disabled people often find public transport inaccessible. They can also experience a lack of flexibility in their travel choices: often travelling involves planning ahead (for example, booking assistance for rail travel, or booking community transport 48 hours in advance), making it difficult to be spontaneous. Where disabled people lack confidence that they can complete a journey safely - that all stages of the journey will be safe and accessible, including the street environment - they may be unwilling to 'risk' travelling. Disabled people who drive experience fewer problems, although the distance of parking spaces from services, and the misuse of disabled parking spaces can cause difficulties.
- **Older people** become less likely to drive and more likely to use public transport (NB this is not borne out by Lucas and Jones, 2009) . Maintaining independence and accessing essential services and social opportunities underpin older people's quality of life. A lack of transport can mean difficulty accessing essential services and facilities, such as pension services and medical services, and can lead to social isolation and loneliness.

4. What key groups and /or geographical areas will be most affected (positively or negatively) by these different social impacts?
- a) What is the likely impact of the policy measures that we have considered on people's travel behaviours?
 - b) Who and where will be most affected by these and how?

This is highly dependent on what policy when and where

5. How are public attitudes (including acceptability) likely to differ between social groups for both mandatory and voluntary options? How will take-up (and the barriers to take-up) of voluntary measures differ between groups?
- In terms of smarter choice measures, boys are more likely to have positive attitudes to cycling than girls. Older people are more likely to be fearful of crime whilst walking around their local area, particularly at night
 - In terms of public transport improvements, young teenagers who are still in school are more amenable to bus travel than adults but are less likely to feel safe while travelling on public transport. There is strong support for improved public transport measures across all groups. Affordability is a strong barrier to more public transport use amongst low income travellers
 - In terms of reduced car travel, young people in rural areas tend to see car travel as essential

There are many more findings on the different groups' attitudes to different transport interventions and their affects, which will be useful to this study but nothing in relation to specific attitudes to climate change policies.

6. What will impact (in qualitative terms in absence of quantitative data) of policy options be on the i) transport behaviours, and ii) CO2 emissions, of different groups?

Not covered.

7. What remaining gaps exist in the evidence base and how could these be filled?

As identified in the report to fully understand and model the impacts of policies on different social groups we need more and better data as follows:

- i. More comprehensive, systematic evaluation of accessibility initiatives.
- ii. More information on the travel modes used by young people in accessing employment and further education.
- iii. Research on the travel needs of disabled people, with specific reference to their travel-to-work needs and initiatives targeted at meeting their travel-to-work needs.
- iv. Greater evidence on the travel needs of women. The review highlights a lack of information on initiatives targeted at the travel needs of women, indicating either a gap in the evidence base or in service provision. It should be emphasised that in order to meet this objective, research is required on 'gendered' travel needs - the differentiated travel needs of men as well as women.
- v. More evidence on the accessibility of choice of schools for children in low income families.
- vi. Evidence on the accessibility of quality food shops.
- vii. Clarity on the travel needs and experiences of children in accessing services and activities outside school.
- viii. Evidence on the extent to which current service provision, specifically routes and timetabling, meet the needs of people from black and minority ethnic groups.
- ix. A review of the need for greater understanding of the relationship between accessibility and the geographical location of services and activities. The tentative tone of this objective reflects the possibility that research on this issue may exist in other literatures (in the field of town planning, for example) which has been missed by the review because of its transport-focused onus.
- x. Greater evidence on people's travel horizons, specifically exploration of factors influencing people's willingness to travel to access employment.

In addition for this study, this improved evidence-base would need to be brought together with that on people's likely behavioural responses to climate change policies and how this might affect their economic and social well-being.

Social and Distributional Impacts of Transport Climate Change Policies

BASIC INFORMATION		
Author(s)	Stantchev, D, Menaz, B	Year of publication 2006
Title/publication	Equity and Accessibility (Third Annual Thematic Research Summary)	
Context	<i>Type of publication e.g. journal article, other article, book, book chapter, working paper, report, conference paper, response to government consultation</i>	Research report
	<i>Type of study e.g. literature review, survey</i>	Literature/policy review
	<i>Geographic – country, region, city</i>	Europe
	<i>Sample size (if relevant)</i>	

Synopsis of Document

This paper provides a summary of Research and Technical Development projects relating to Equity and Accessibility. It includes lengthy definitions of the key terms: equity, mobility and accessibility and outlines the theme's significance throughout Europe. It then outlines the European policy context in relation to the theme.

The European projects reviewed are split into the following categories:

- Measurement of equity and accessibility;
- Mobility;
- Mobility substitutes;
- Development control and land use planning to increase accessibility;
- Accessibility for freight and for passenger activities;
- Incorporation of accessibility into analytical techniques; and
- Transport for the disabled, non-drivers and other disadvantaged groups.

1. What climate change policies are we concerned with?

None, it looks at equity and mobility.

2. What key groups will be impacted (positively or negatively) by different climate change policy options?

- a) What is the likely impact of the policy measures that we have considered on people's travel behaviours?
- b) Who and where will be most affected by these and how?

Piecemeal information on this, taken from the summaries of different European research – some key points are cut from the document and outlined below. Some mention of different socially excluded groups, but no information outlining the impact of different climate change policy options upon these key groups:

The other reason for the growing importance of the equity objective is the increasing awareness of the special needs of certain sections of the population, such as the elderly and the disabled. Special vehicle and infrastructure provisions for those with physical disabilities are increasingly implemented in public transport services. Special parking policy arrangements are also dedicated to these segments of the population.

The transport system has to ensure that accessible provision is made for all. The policies have to ensure that the benefits of transport are fairly distributed or focused on those with

special needs. There is a need to provide access to transport for lower income residents, those without cars, the elderly and disabled and those living in deprived areas, as well as providing an alternative to car owners to achieve greater modal choice and balance.

Social exclusion is greatest amongst unemployed and elderly people but most people can give examples of being excluded from some social and leisure activities due to access problems.

Transport issues are important to disabled people's lives – being the single most prominent concern at the local level. Pavement and road maintenance generate the most dissatisfaction, along with access for disabled people to transport vehicles and the frequency of public transport.

3. What are the potential key social impacts of different climate change policy options?

- a) For each key potential social impact (bearing in mind Atkins' definition), we need to identify the policies that potentially have the (positive or negative) impact. Where impact is dependent on other factors (e.g. scope or stringency of policy, way in which investment is undertaken), these need to be identified clearly.
- b) Can any disproportionately negative affects be mitigated or positive ones be further maximized? If so, how?

Not much detailed information on this within the document. Most information relates to policy options which have been implemented/tested across Europe and their effects upon accessibility in general, rather than any details being given on the social impacts. Some key results from the document are pasted below:

A UK pilot study has identified a number of improvements in rural health transport which, as a result, have bettered the access to healthcare. These improvements include:

- A more flexible service more able to respond to passenger needs now and better suited to meeting more diverse demands, expected in the future;
- Improvements in identification of needs for and provision of social transport;
- Improvements in the efficiency of journeys provided by volunteer drivers;
- A reduction in the costs per journey provided by volunteer drivers;
- Reductions in the time surgeries spend arranging transport;
- Improvements in the quality of booking systems;
- Improvements in provider and passenger liaison;
- Improvements in journey time and convenience;
- Reductions in the time out-patients spend waiting for transport following an appointment;
- Improvements in the recruitment and support available to volunteer drivers;
- Increased capacity to provide for after-hours services, transport of samples, hospital transfers, etc; and
- Improved co-ordination through base to driver communications.

ECMT's 'Charter on Access to Transport Services and Infrastructure' underlines Europe's political commitment to ensuring that all new transport infrastructure takes into account the needs of those with impaired mobility. It emphasised the fact that the number of disabled people is growing, and that everybody has the right to independent living.

ECMT put forward that the minimum accessibility requirements must include: full access for wheelchair users and include accessible lifts and toilets where appropriate; facilities to aid people with difficulties in walking, gripping, reaching or balancing (including non-slip

surfaces, hand rails and handholds); facilities to assist blind and partially sighted people (including consistent use of colour contrast, clear signing and lighting, non-reflective surfaces, audible as well as visual announcements, and facilities for people who are deaf or hard of hearing (including visual as well as audible announcements, induction loops and clear signs).

All policy initiatives or developments in transport and land use planning should include an evaluation of their potential impact on safety and accessibility of older and disabled people; all links in the transport chain need to be improved so that an accessible environment is created door-to-door and increased efforts must be made to connect the different means of transport and thereby create an integrated, safe and accessible transport system; all new investments in transport must take account of and plan for the needs of older and disabled people in accordance with the ECMT Charter in 1999; close co-operation between governments, public authorities, manufacturers, operators and the people concerned is essential.

Norwegian research was conducted into how public transport can be better adapted to users' needs, especially those of older people and non-drivers. Good physical accessibility (low floor buses, etc) and good "mental" accessibility (simple network, easy-to-understand information, simple fares structure, etc) were acknowledged as important factors which increase public transport use by these vulnerable user groups.

The Norwegian study also insisted that new IT solutions should complement rather than replace traditional forms of information such as printed timetables and network maps. This is because many vulnerable user groups (particularly older people) either do not have access to "advanced" media or have problems in using it.

4. How will these impacts (positive or negative) differ between social groups (distributional impacts)?
 - a) Are there any disadvantaged groups or areas that may be negatively or positively affected? If so, how?
 - b) Can any disproportionately negative affects be mitigated or positive ones be further maximized? If so, how?
 - c) To what extent is the impact dependent on the area in which the different social group live?

No information on distributional impacts, other than what is contained in response to question 2

5. How are public attitudes (including acceptability) likely to differ between social groups for both mandatory and voluntary options? How will take-up (and the barriers to take-up) of voluntary measures differ between groups?

No information on attitudes to measures.

6. What will impact (in qualitative terms in absence of quantitative data) of policy options be on the i) transport behaviours, and ii) CO2 emissions, of different groups?

No information on behaviours or emissions.

7. What remaining gaps exist in the evidence base and how could these be filled?

The report does not assess gaps.

For social groups who may experience problems with accessibility to transport (e.g. disabled or older people) - research into attitudes to climate change policy measures and impacts on behaviours/emissions?

Social and Distributional Impacts of Transport Climate Change Policies

PART A – BASIC INFORMATION			
Author(s)	Penfold et al (National Centre for Social Research)	Year of publication	2008
Title/publication	Travel Behaviour, Experiences and Aspirations of Disabled People		
Context	Type of publication e.g. journal article, other article, book, book chapter, working paper, report, conference paper, response to government consultation	DfT Report	
	Type of study e.g. literature review, survey	In-depth surveys with disabled	
	Geographic – country, region, city	UK	
	Sample size (if relevant)	45 disabled people	

Synopsis of Document

This report presents the findings of a qualitative study commissioned by the Department for Transport (DfT) exploring the travel behaviour, experiences and aspirations of disabled people. The aim of the research is to provide an in-depth understanding of the role that transport plays in the everyday lives of disabled people, and the key barriers and enablers experienced in relation to accessing and using transport.

The key objectives of the research were to:

- Describe disabled people's current transport needs and behaviour(s).
- Discuss disabled people's experiences of using transport, now and in the past.
- Explore the transport aspirations of disabled people.
- Examine whether the DfT's policies aimed at improving mobility and accessibility for disabled people are having an impact.
- Consider how transport facilitates or restricts disabled people's access to employment, key services and social networks.

1. What climate change policies are we concerned with?

None, the report looks at travel behaviour of disabled people.

2. What key groups will be impacted (positively or negatively) by different climate change policy options?

- a) What is the likely impact of the policy measures that we have considered on people's travel behaviours?
- b) Who and where will be most affected by these and how?

Disabled people with Physical Impairments or Chronic Health Conditions

Car access was described as being 'fundamental' to maintaining mobility and independence by people with physical impairments and chronic health conditions. They felt that without having access to a car they would not be able to get out as often and would be 'housebound' for more of time, able only to make essential journeys. Waiting at bus stops and train stations, getting on or off buses and trains, and getting to a seat all acted as barriers for people to consider alternatives to using their car. Generally bus stops and train stations were considered too far away from participants' homes and/or their usual destinations which acted as a deterrent to usage as people did not want to tire themselves out before even reaching their destination.

Journeys where changes would be required on public transport, or where the journey would be significantly longer if made by public transport were also considered too physically demanding by participants.

The Blue Badge, Motability and 'ServiceCall' schemes were particularly important for people in maximising access to employment, services and social networks through car use.

People identified a number of key barriers in using public transport, private hire vehicles such as taxis and minicabs, and aeroplanes. These barriers were experienced in the context of the nature of their disability or health condition and were found at all stages and in all aspects of making a journey. Barriers related to three key aspects of making a journey:

- planning;
- physical access and facilities; and,
- approach of transport staff.

Although improvements to public transport since the introduction of the Disability Discrimination Act were welcomed, there was still a lack of confidence about whether all aspects of a journey would be accessible. Overall, people were concerned about physical access and facilities, the approach of transport staff, and issues to do with planning. For example, people felt that there was a lack of information about public transport including:

- information relating to physical accessibility; and,
- information about the assistance they could expect from transport staff in order to ensure their safety and security.

People felt that more information would help them make more informed choices about whether particular types of transport, or travel routes, would be suitable for them to use. In the absence of clear and comprehensive information people felt reluctant to try making journeys by public transport instead of always using their cars.

Disabled people with Sensory Impairments

The research identified five key factors which could act as barriers or facilitators to transport use and travel for people with sensory impairments:

- physical access;
- information and communication;
- attitudes of transport staff;
- confidence; and,
- cost.

Participants' concerns about the physical environment or information and communication could be alleviated by positive experiences of interactions with transport staff. Helpful interactions seemed to be especially beneficial in giving people the confidence to travel independently and make new journeys.

People with sensory impairments had overcome multiple barriers to independent travel through various strategies. These included:

- having an assistance dog;
- undertaking travel training; and,
- building up relationships with local transport staff.

Disabled people with Mental Health Support Needs

People with mental health support needs were travelling to a range of destinations for a variety of purposes, including: voluntary work and education; domestic responsibilities; healthcare; and, social and leisure activities. None of the people drove their own car, although some had access to a car on an ad hoc basis driven by another family member. Public transport and walking were the main modes of transport. Taxis were also occasionally used but this was for specific purposes or linked to the time of travel. People also used hospital transport for travel to health appointments. For travel further afield for days out or for holidays, people travelled by train and exceptionally by car.

The decision not to drive varied across participants. For some, they were unable to drive because of their medical condition. In other cases, people had never driven and had always relied on public transport to make their journeys. Exceptionally, people expressed a desire to drive but were unable to because unemployment meant they were financially constrained.

Confidence was a key factor in participants' experiences of using transport. The research identified three key factors which underpinned participants' levels of confidence to travel and make journeys. These factors were:

- routine and planning;
- safety and control; and,
- affordability and finance.

Disabled people with Learning Difficulties

There were four enablers which underpinned independent travel and transport use for people with learning disabilities. These were:

- travel training;
- accessible transport information;
- a safe street environment and space on transport; and,
- positive interactions with transport staff and other transport users.

General

"Access' is a fundamental issue in realising disabled people's entitlement to achieve the same opportunities as non-disabled people, relating to both attitudinal and physical barriers. Clearly, access to transport and the accessibility of transport are key. However, people with disabilities are less likely to drive and more likely to be dependent on public or community transport, or lifts from family and friends. Public transport is often experienced as inaccessible. Disabled people's travel is limited both by a lack of accessible services, and by a lack of confidence that they will be able to complete journeys without encountering problems. This can be a barrier to social inclusion - making it difficult for people with disabilities to access education and employment, services and social networks.'(Smith et al., 2006: 62)

Findings from the research have cross-cutting implications for current policy strategies and specific policy initiatives. Of particular relevance are the Independent Living Strategy (aim is to promote independent living for disabled people through giving disabled people more choice and control over the support they need and greater access to employment, transport and mobility, health and housing.), the Blue Badge scheme review, and revisions to the codes of practice for train and station design and air travel for disabled people.

3. What are the potential key social impacts of different climate change policy options?

- a) For each key potential social impact (bearing in mind Atkins' definition), we need to identify the policies that potentially have the (positive or negative) impact. Where impact is dependent on other factors (e.g. scope or stringency of policy, way in which investment is undertaken), these need to be identified clearly.
 - b) Can any disproportionately negative affects be mitigated or positive ones be further maximized? If so, how?
4. How will these impacts (positive or negative) differ between social groups (distributional impacts)?
- a) Are there any disadvantaged groups or areas that may be negatively or positively affected? If so, how?
 - b) Can any disproportionately negative affects be mitigated or positive ones be further maximized? If so, how?
 - c) To what extent is the impact dependent on the area in which the different social group live?

No information on how the impacts differ between social groups, as the document focuses solely on disabled people.

5. How are public attitudes (including acceptability) likely to differ between social groups for both mandatory and voluntary options? How will take-up (and the barriers to take-up) of voluntary measures differ between groups?

No information given.

6. What will impact (in qualitative terms in absence of quantitative data) of policy options be on the i) transport behaviours, and ii) CO₂ emissions, of different groups?

No information given.

7. What remaining gaps exist in the evidence base and how could these be filled?

None outlined within document.

Social and Distributional Impacts of Transport Climate Change Policies

PART A – BASIC INFORMATION		
Author(s)	Taylor et al	Year of publication 2007
Title/publication	Understanding the Travel Aspirations, Needs and Behaviour of Young Adults	
Context	Type of publication e.g. journal article, other article, book, book chapter, working paper, report, conference paper, response to government consultation	DfT Report
	Type of study e.g. literature review, survey	Focus groups and in- depth interviews
	Geographic – country, region, city	
	Sample size (if relevant)	36 young people

Synopsis of Document

This report presents the findings of a qualitative study exploring the travel needs, behaviour and aspirations of young people as they make the transition into adulthood. The study was commissioned by the Department for Transport (DfT) and is the second of three qualitative studies following up participants from the National Travel Survey with a view to providing a better understanding of the transport needs of particular groups within the population. The study is intended to inform policies which reflect the Department's commitment to ensure 'transport that works for everyone', as set out in the Future of Transport 2004 White Paper (DfT, 2004).

1. What climate change policies are we concerned with?

None, the report looks at travel behaviour of young people.

2. What key groups will be impacted (positively or negatively) by different climate change policy options?

- a) What is the likely impact of the policy measures that we have considered on people's travel behaviours?
- b) Who and where will be most affected by these and how?

(N.B. – all information below relates to young adults – 16-25 year olds)

The main barriers (for young adults to accessing key services) identified through this research were:

- **Cost:** this includes difficulties in meeting the cost of travel - especially amongst older teenagers and young adults who pay for travel themselves, and problems relating to the availability, consistency in eligibility criteria and recognition of concessionary passes for young people.
- **Availability, reliability and timetables:** young people in rural areas reported having to rely on irregular bus schedules, with limited or no transport late at night. For young people in urban areas, issues such as congestion, unreliability and infrequency of public transport were barriers to transport use.
- **Safety:** personal safety concerns and perceptions of risk are taken into account by young people (and particularly by young women and their parents) in their choice of transport.
- **Travel horizons:** a limited willingness to travel for longer distances or outside familiar areas can also present a barrier to young people confidently using transport to travel outside their home areas.

Availability of transport can be an influential factor in young people's choice of education or training institution, the employment and leisure activities available to them and their access to key services including housing. The choices and opportunities available to young people in rural areas are particularly constrained, with access to a car playing a critical role in opening up choices in relation to education, training, leisure and employment.

People did not always find it easy to estimate their expenditure on transport. Public transport users referred to the cost of daily, weekly or monthly tickets, but were less confident in making a global estimate of their travel costs. Car users tended mainly to think about the cost of their cars in terms of fuel costs. Estimating costs was made complicated by the fact that young people were not always responsible for meeting all their transport costs themselves. Parents tended to pay for some or all of younger people's travel expenditure, for example giving 16 and 17 year olds money for school journeys and for taxi fares in the evening. Young people also did not monitor their expenditure on transport closely because it was regarded as an essential expense, so there was limited attention to managing costs.

A final aspect of young people's mobility was how satisfied they were with their travel and mobility. There was not a linear relationship between the amount of young people's mobility and their satisfaction with their travel. Although there were very mobile people who were satisfied with their travel, there were also very mobile people who were not satisfied with their travel.

Views of public and private transport

As might be expected, the views of the young people in this study regarding different modes of transport varied significantly. Some liked buses, others did not; some were keen on trains, while others thought trams were the best form of transport. In part, this reflected the fact that the individuals taking part in the research lived in different parts of the country with different local services, which meant they were not comparing like with like. It was also the case that discussions of public transport were dominated by talk of buses, as it was the mode most commonly used by participants.

Although the distinctions young people made between different modes of transport largely reflected differences in the quality of provision in their local area, what were perceived as the inherent benefits and limitations of different modes affected participants' views. Generally, trains were seen as more reliable than buses and this seemed to be linked to a feeling that train timetables were more rigid than bus timetables. Linked to this was the feeling that it was easier to find out about train times, either by phone or at the station, though this was less true where there were digital information boards at bus stops. On the other hand, one of the attractions of buses compared to tubes was that they enabled travellers to see many different parts of their local area; the corollary of this was that they were perceived by some participants as 'going round the houses' rather than going directly to their destination and therefore slower than they need be. Buses also differed from trains because the driver was a visible presence, and this had negative and positive implications.

Private transport

Young people had many comments to make about **cars**, and the different dimensions of their views are discussed later in this section. However, underlying their views seemed to be a basic orientation towards cars that ranged from positive to negative. Having a particular orientation did not mean an individual would solely express positive or negative views about cars. However, an individual's basic orientation seemed to act as a reference point when they were discussing the benefits and drawbacks of cars.

Cycling was seen as helping individuals to become fitter and stronger, but also carried overtones of more general well-being with some participants using terms like 'doing good to yourself' to describe the benefits of cycling. The advantage of combining physical activity with transport or 'killing two birds with one stone' was also mentioned. The environmental benefits of cycling were seen both in terms of contributing to a reduction in large scale environmental impacts of transport use, but also in terms of reducing the harmful effect of emissions on individuals at a local level through improved air quality. Other advantages associated with using bikes were the potential to avoid congestion and get to places more quickly, and the fact that cycling was associated with having a private physical and mental space in contrast to the shared space of public transport with its accompanying noise and disturbances.

Bicycles were also seen as having a number of disadvantages. Exposure to the elements, particularly when an individual was wearing expensive clothes, was regarded as a significant drawback. The physical effort needed to cycle was also raised as an issue, especially when the journey came at the end of the day when individuals felt they would already be tired. Some individuals lacked confidence in their basic competence and felt they simply could not ride well enough to use a bike as a form of transport. This was linked, in some cases, to a strong belief that roads were not safe for cyclists, a view in part informed by observations of potentially dangerous incidents.

Motorbikes and scooters did not feature strongly in participants' views about transport. In some cases, individuals were using them to overcome transport difficulties, such as limited local services, while others used them because of their association with excitement or because they were relatively inexpensive to use and run. However, non-users and some users had negative feelings about motorbikes and scooters. A central concern was safety, with a number of participants saying they had either heard about a lot of injuries or had friends or knew people who had been injured riding motorbikes and scooters, though there was a feeling that scooters were less dangerous than motorbikes due to their smaller size. Nevertheless, some participants seemed subconsciously to make a causal link between using a scooter and driving dangerously.

Transport Decision Making

The transport choices of young people reflected the costs and benefits associated with particular modes, individual circumstances and underlying preferences, as well as the options perceived to be available or acceptable. Their choices could vary over time due to factors such as mood and the resources they had available, and in some cases temporary variations led to longer term changes. The process by which young people made decisions about transport varied from being considered and planned to being automatic or involving little conscious thought.

Learning to drive seemed natural and automatic for some young people, but for others involved a conscious choice. Having decided to learn to drive in principle, there were a range of factors that 'pulled' or 'pushed' individuals to actually take driving lessons, but also a range of barriers that stood in the way, particularly the cost of lessons. Similarly, cost was a major barrier to car ownership, though some young people had a limited sense of the full costs associated with owning or running a car. Nevertheless, there were strong feelings about the kinds of car young people desired, reflecting both practical considerations and social and cultural ones.

3. What are the potential key social impacts of different climate change policy options?

- a) For each key potential social impact (bearing in mind Atkins' definition), we need to identify the policies that potentially have the (positive or negative) impact. Where impact is dependent on other factors (e.g. scope or stringency of policy, way in which investment is undertaken), these need to be identified clearly.
 - b) Can any disproportionately negative affects be mitigated or positive ones be further maximized? If so, how?
4. How will these impacts (positive or negative) differ between social groups (distributional impacts)?
- a) Are there any disadvantaged groups or areas that may be negatively or positively affected? If so, how?
 - b) Can any disproportionately negative affects be mitigated or positive ones be further maximized? If so, how?
 - c) To what extent is the impact dependent on the area in which the different social group live?

Little information on distributional impacts as study concentrates on young adults only.

A little information relating to a desire of one young ethnic minority person thinking that public transport information should be available in more languages.

Some comparison between young adults living in rural and urban areas, those on low incomes etc, e.g.:

The groups whose choices were most constrained by transport were those living in rural areas, young parents and those who were out of work.

A key policy priority is to ensure that transport facilitates access to key services. Transport is both an enabler and a barrier to young people's access to employment, education and leisure. The study suggests that widening access to key services will require the improvement of local transport provision, especially in rural areas; reduction in costs for low income groups; decisions about the location of key services which reflect transport infrastructures; and, potentially, support for access to motorised vehicles (e.g. 'wheels to work' type schemes which lease out mopeds) in areas with few alternatives.

5. How are public attitudes (including acceptability) likely to differ between social groups for both mandatory and voluntary options? How will take-up (and the barriers to take-up) of voluntary measures differ between groups?

Young people's recommendations for transport

The recommendations made by young people, as one might expect, closely reflected their assessments of their local transport provision. As such, a major theme running across many of the recommendations was to improve or extend existing services. Recommendations also included increasing the number of bus stops with digital displays and the number with bus shelters, making sure buses were cleaner and improving the safety and facilities available at bus and train stations. Participants who were parents were keen for there to be increased space on buses for those who were travelling with buggies.

There was strong support for the extension of concessions to those over 16 and under 65, including to those who were unemployed, students and parents of young children. This support often reflected the personal circumstances of the individual making the

recommendation and was commonly motivated by a sense of unfairness about existing schemes.

A number of individuals felt that there should be stricter enforcement of rules and regulations related to transport, particularly in terms of people using public transport without paying and people driving on the roads without the correct tax or insurance.

Though not a repeated theme, there were some suggestions that related to improving access to transport for disadvantaged groups. One participant from a minority ethnic background suggested that services for non-English speakers needed to be improved through having information available in a wider range of languages and by having staff available at stations who were able to help those who were having difficulty interpreting or navigating the transport system. There were also suggestions that the government could help with the cost of driving lessons and that transport information should be available through teletext for those who did not have access to the internet. A number of recommendations related to reducing the impact of transport on the environment.

Finally, there were a number of recommendations specifically aimed at improving the transport environment for cyclists. These included extending the number of places where cyclists could leave their bikes and increasing the security of them. There were also recommendations to increase the number of cycle paths, improve their layout and improving their safety by lighting them better.

6. What will impact (in qualitative terms in absence of quantitative data) of policy options be on the i) transport behaviours, and ii) CO₂ emissions, of different groups?

The availability of transport widened the choice of education and training institution available to some young people. Where transport links were good, this allowed young people to make choices based on criteria other than transport, for example, the courses or the quality of education offered. However, where other criteria were equal, ease or cost of travel sometimes tipped the balance in favour of a specific institution, often the one closest to the young person's home. This was particularly the case where young people anticipated that the transition into education would be challenging, so that the ease with which they could travel to education or training was an important factor.

In areas that were less well served by public transport, young people's options could be more limited in terms of the areas where they could contemplate working and the hours or shifts they were able to work. Lifts from family and friends sometimes helped young people make journeys when public transport was not available. The cost of transport also limited choices in some instances.

The availability of public transport in the evenings was an important influence on whether young people socialised with friends at pubs, gigs and nightclubs, particularly where they could not afford taxis. Young people in rural areas were most constrained in their social transitions by the availability of transport.

7. What remaining gaps exist in the evidence base and how could these be filled?

Gaps as identified in the report:

Finally, in terms of future travel and transport, car ownership features very prominently in young people's future aspirations (DETR, 1999). However there has been relatively little other exploration of young people's future travel and transport aspirations.

Other:

No information or discussion around policy impacts, e.g. road pricing, also little discussion around walking.

Author(s)	Jean Taylor, Matt Barnard, Hayley Neil and Chris Creegan	Year of publication	2009
Title/publication	<i>The Travel Choices and Needs of Low Income Households: the Role of the Car</i>		
Context			
	<i>Type of study e.g. literature review, survey</i>		
	<i>Geographic – country, region, city</i>		
	<i>Sample size (if relevant)</i>		

1. What climate change policies are we concerned with?

The report mainly focused on the social benefits of car use by low income households and so by implication the possible negative effects of reducing this.

2. What are the potential key social impacts of different climate change policy options?

- a) For each key potential social impact (bearing in mind Atkins' definition), we need to identify the policies that potentially have the (positive or negative) impact. Where impact is dependent on other factors (e.g. scope or stringency of policy, way in which investment is undertaken), these need to be identified clearly.
- b) Can any disproportionately negative affects be mitigated or positive ones be further maximized? If so, how?

3. How will these impacts (positive or negative) differ between different social groups (distributional impacts)?

- a) Are there any disadvantaged groups or areas that may be particularly negatively or positively affected? If so, how?
- b) Can any disproportionately negative affects be mitigated or positive ones be further maximized? If so, how?
- c) To what extent is the impact dependent on the area in which the different social group live?

Both direct and indirect benefits were identified:

- i. Direct benefits:
 - o Ability to participate in a range of activities in terms of employment and income. Some people would have been unable to do particular kinds of jobs without having access to a car, for instance where they had to carry a lot of equipment. Job search - the areas where people could look for jobs and ability for people to combine work with childcare or take shifts at times when public transport was not operating.
 - o Maintenance of social networks. It had implications for both the frequency of meetings between family and friends and the range of relationships people had.
 - o Ability to carry out domestic tasks. People felt they would be able to buy fewer things in any one shopping trip because they would be able to carry less and would be less able to make spontaneous or 'emergency' shopping trips.
 - o Take up of leisure opportunities - cars enable people to take part in activities that required heavy equipment or visit places that were difficult to access otherwise.
- ii. Indirect benefits.

- Mental wellbeing. For some people, the fact that cars enabled people to participate in a range of activities was seen as important to their mental health and they indicated that without the contact they got through these activities they would become lonely and even, in some cases, depressed.
 - Feelings of security - cars gave them a sense of security even when it was not being used and linked to this was the idea that it imparted a feeling of 'freedom', allowing them to go where they wanted when they wanted.
 - Independence - For some people, cars represented independence. They feared that if they did not have access to a car they would have to ask others for lifts, which could make them feel like they were a 'burden'.
4. What key groups and /or geographical areas will be most affected (positively or negatively) by these different social impacts?
- a) What is the likely impact of the policy measures that we have considered on people's travel behaviours?
 - b) Who and where will be most affected by these and how?

They could mean reduced car use for low income drivers (see Lucas et al 2001, for more on this). The report found that both the direct and indirect effects of cars were affected by both contextual and individual factors. The extent and viability of the local infrastructure was clearly important in affecting the degree to which people were reliant on their cars, while the significance they place on particular activities, along with how far they would normally consider travelling also made a difference. In addition, people's social support networks and their own health and mobility influenced the degree to which cars affected their access to services. Without a car, some people described focusing their efforts on maintaining contact with family and had therefore seen friends less often. In some cases, access to education was also affected, particular in terms of enabling people with children to choose particular schools or to combine parenting with attending college.

5. How are public attitudes (including acceptability) likely to differ between social groups for both mandatory and voluntary options? How will take-up (and the barriers to take-up) of voluntary measures differ between groups?

Awareness of the costs associated with car ownership and use varied considerably. These were in part related to the different approaches to budgeting for car use but also how people thought about costs, for example, whether they viewed the car as something already paid for or considered the cost of journeys on an individual basis. The types of car costs identified by people fell into three broad categories: 'fixed' car costs such as MOTs and car tax; 'variable' costs such as petrol and maintenance; and 'extra' costs which included car seats for children.

6. What will impact (in qualitative terms in absence of quantitative data) of policy options be on the i) transport behaviours, and ii) CO2 emissions, of different groups?

Not clear from this report

7. What remaining gaps exist in the evidence base and how could these be filled?

The report suggests that A quantitative survey might helpfully measure how much influence cost has on low income households' decisions about whether or not to use a car for specific journeys and how this compares to households with higher levels. A survey might also

consider at what level car costs are considered prohibitively expensive as well as how the willingness and ability of low income households to use alternative modes of transport compares to other income groups. This kind of research would help guide the impact of travel poverty and therefore the amount of resources that would potentially be need to address the issue. The focus group stage of the research indicated that there are also some specific types of low income households which may benefit from particular attention for example, women from specific ethnic groups who may use cars differently from other groups.



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