



Potential Impacts of National Road user Charging in Rural Areas: a Scoping Study to Identify Required Research

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Executive summary

- The project was a scoping study designed to identify the potential impacts on rural areas of the introduction of a national road user charging scheme. Over 150 pieces of literature were reviewed.
- A series of first and second order effects are identified although few evidence-based insights into how these are likely to play out in rural areas can be gained from existing studies.
- Econometric models predict that changes in rural traffic levels could be anywhere between -1% and +10%, but as yet they are not refined enough to predict changes to car use and wider journey-making in different rural localities.
- Agencies such as the former Countryside Agency and the Campaign to Protect Rural England (CPRE) agree that while the concept of congestion charging is welcome, the type of scheme and charging structure are vital, and that there are likely to be unintended outcomes in rural areas.
- Wider outcomes could include increased car dependence and associated decline in rural shops, services health care; less viable public transport (for rural to rural journeys); diminished road safety; social severance; increased pollution and environmental impacts; threatened rural vitality; loss of rural tranquillity and changes in house prices.
- The distributional impacts of charging are likely to vary from locality to locality and from region to region, reflecting the heterogeneity of rural areas.
- Current models are based on marginal social cost pricing, placing emphasis on the value of time and congestion costs. Other road pricing schemes and charging structures could be adopted which emphasise different policy objectives. The price signals associated with each scheme would generate a unique set of distributional impacts across the countryside.
- The potential tension between economic, environmental and competing social inclusion objectives mean that there is unlikely to be one optimum charging scheme for rural England.
- More work is required to explore the impact of charging in rural areas. The report outlines a proposed follow up research project to explore the likely impacts of different charging regimes at the rural micro-scale. Results from such a project will generate new and important insights and can be used to refine the assumptions underpinning existing econometric models.

1. Introduction and background

“The Road Pricing Feasibility Study concludes that a national scheme has the potential to cut congestion by about a half as well as providing environmental benefits. It says that road pricing is becoming technically feasible in the next 10-15 years.... We must build a public consensus around the objectives for road pricing and how to use the revenues” Alistair Darling, July 2004 (DfT, 2004a).

1.1 Introduction

- 1.1.1 Following the publication of the *Road Pricing Feasibility Study* (Department for Transport (DfT), 2004), the UK government is now talking in positive terms about a national road user charging scheme being introduced within the next 10-15 years.
- 1.1.2 It is also likely that a number of local urban schemes will be introduced in the next few years in connection with the recent Transport Innovation Fund (TIF) awards. These will manage urban congestion and raise revenue for transport infrastructure and services, but will also act as pilot projects for the full implementation of a national scheme.

1.2 National congestion charging and rural areas

- 1.2.1 Proponents of a national congestion charging scheme have emphasised the positive benefits for rural motorists, in terms of a reduction in overall motoring costs. National road user charging is widely believed to be more equitable for those living in the country, many of whom rely on their vehicles far more than urban dwellers to perform every day activities, and whose car use *generally* causes little in the way of congestion and environmental pollution. The rural poor – 12 per cent of whom would not own a car if they lived in urban areas – are viewed as especially vulnerable to rising fuel prices (Gray *et al.*, 2001).
- 1.2.2 Concerns about the cost of rural motoring – rightly or wrongly – were partly responsible for the abandonment of the Government’s primary instrument for managing demand for road use, the Fuel Duty Escalator. This was a significant decision in relation to overall transport policy because, although unpopular, the Escalator had almost stopped the growth in national demand for road use (Glaister, 2003).
- 1.2.3 It is likely that the introduction of the new demand management tool of national road user charging would affect travel patterns in rural areas as rural dwellers and others travelling through the countryside responded to different price signals precipitated by changing the way we pay for road use. This implies a series of wider implications for rural society, but little is known about what the nature and extent of these implications may be.
- 1.2.4 *Prima facie*, it would seem that a series of first and second order effects would be related to the introduction of some kind of road user charging scheme. These can be expressed as a series of research questions.

1.3 Research questions: 1st order effects

1.3.1 The cost of rural motoring:

- If national road user charging is introduced, how will it affect the cost of motoring – as part of wider household expenditure – in rural areas?

1.3.2 Car dependence. Given forecast changes to the cost of motoring, what will be the likely impact on:

- Car ownership in rural areas (how much higher can it go – will the number of multi-car owning households rise further)?
- Car use and modal share?
- The number of car journeys?
- Journey distance and destination?
- Rural traffic levels?

1.3.3 Local charging:

- How would a local charging scheme affect the cost of motoring – as part of wider household expenditure – in a rural hinterland?
- Would a local scheme affect car ownership levels, car use and modal share, car journeys areas, their distance and destination, and local traffic levels?

1.4 Research questions: 2nd order effects

1.4.1 Road safety

- Will national road user charging have an adverse impact on rural road safety?
- Is it the case that increasing traffic volumes will cause more accidents in sparsely populated areas, but road safety will be improved in other rural areas which currently have heavier traffic levels as average vehicle speed will be lowered?
- Would a local scheme have sufficient bearing on travel volumes to affect road safety?

1.4.2 Rural public transport

- Will national road user charging undermine the viability of rural public transport? How would different approaches effect demand for conventional bus services, demand responsive approaches and community transport?
- Will rural-to-metropolitan public transport (such as commuter rail and park and ride) thrive while rural-to-rural provision (such as rural bus services and community transport) declines following the introduction of national congestion charging?
- Would local congestion charging schemes, as might be expected, increase demand for rural-to-metropolitan public transport?

1.4.2 Tranquillity, air quality and social severance: what are the implications of a changing weight of traffic in rural villages on:

- Tranquillity and rural character
- Local air quality?
- Social participation for those living on busy rural routes?

- 1.4.3 House prices: How will national road user charging and local congestion charging affect patterns of:
- Urban-rural migration?
 - Commuting destination/distance?
 - Rural house prices (both overall and localised effects around park and ride and rail stations)?
- 1.4.4 Social participation and rural vitality: would road user charging impact on social inclusion and access to and the viability of rural:
- Shops?
 - Services?
 - Post offices and banks?
 - Healthcare?
 - What are the implications of national and local congestion charging schemes for existing policies such as:
 - Accessibility planning?
 - Rural capacity building?
 - Combating social exclusion?
 - How will the impact of a national scheme differ from the effects of local charging?

1.5 Scope and outline of report

- 1.5.1 This report represents the findings of a desk top review of over 150 reports, websites and academic articles, aiming both to identify existing research and key issues in relation to the potential impact of national road user charging in rural areas and to make recommendations about a follow up research project.
- 1.5.2 Research for this report also included interviews undertaken with representatives of the Campaign for the Protection of Rural England (CPRE), the former Countryside Agency and officials from Defra and the DfT.
- 1.5.3 Using the above research questions as a guide, the report is structured as follows:
- Section 2 reviews key rural transport trends;
 - Section 3 reflects on the theory of road pricing and the emergence of a national road charging scheme;
 - Section 4 considers the possible 1st order effects on rural traffic and travel patterns following the introduction of charging;
 - Potential wider 2nd order effects are discussed in section 5;
 - The report concludes with an outline proposal for a follow-up research project, examining the impact of different road user charging scenarios at the rural micro scale (Section 6);
 - A full bibliography is presented in Section 7.

2. Key Trends

‘Traffic is forecast to grow... Peak hours are spreading. Most congestion occurs in urban areas and on strategic long distance routes in the vicinity of urban areas. Our patterns of living, working and doing business are leading to more and longer road journeys, with reducing car occupancy rates’ (Department for Transport, 2003).

2.1 Car ownership and use

- 2.1.1 Increasing car ownership, facilitated by steady economic growth and allied to investment in the road network, has brought about a decentralisation of people and industrial and economic activities from the centre of cities to out-of-town developments and to the countryside. In turn, decentralisation, and the dispersal of home, work, education, leisure and shopping, has encouraged more travel intensive lifestyles, an increase in the number of trips and distance travelled and a greater dependency on the car (CfIT, 2002).
- 2.1.2 The mutually reinforcing relationship between cultural and societal change and rising car use (during a time of prolonged economic prosperity) has in part been facilitated by planning, housing and economic development policies. Motoring costs have also remained static over a period of time when public transport fares have increased substantially.
- 2.1.3 Key statistics include:
- The number of households with access to one car increased from 52% in 1972 to 75% in 2002 (National Statistics, 2004).
 - The average journey length for commuting, shopping and education trips increased by over a third between 1985/6 and 2003 (CPRE, 2004).
 - Between 2003 and 2004 traffic on UK’s roads increased by 1.7% (DfT, 2005). DfT (2004) anticipates that there will be a 30% increase in road traffic by 2015 compared to traffic levels in 2000.
 - Motoring costs were 2% lower in 2002 than in 1974, while rail and bus increased by 75% and 58% respectively over the same period (DETR, 2003).
- 2.1.4 Rising car use has resulted in increased congestion and vehicle emissions.
- Estimates (although these are highly contestable) place the cost of congestion to the British economy at £15-20 billion annually.
 - CO2 emissions from road transport grew by 5-10% between 1990-2000 and they are expected to grow by another 6-9% between 2000 and 2010. Transport’s share (excluding the UK’s share of international aviation) of carbon dioxide emissions by end user could rise from 29% in 2000 to 32% by 2020 (CfIT, 2005).

2.2 Car use in rural areas

- 2.2.1 Rural households rely more on the car, own more cars, make more journeys over longer distances and spend more per week on motoring than those from more densely populated localities (CfIT, 2001; DfT 2005).
- 89% of rural households either own or have regular use of a car (or light van) compared to 74% nationally.
 - Drivers from rural areas make 32% more trips per year than those living in urban areas and the average journey length is 81% longer.
- 2.2.2 Reliance on the car is also increasing. Car ownership has risen from 78% in 1985/86; the proportion of journeys made by car increased from 64% to 78% between 1985/86 and 2005. That said, car ownership has been growing more slowly in rural areas than nationally, suggesting that urbanised areas are 'catching up' with the countryside, where the rate of increase in car ownership has peaked.
- 2.2.3 Traffic levels are also increasing faster on rural roads than on urban roads.
- 20% of the population live in rural England, yet some 60% of motorised traffic is found in rural areas (CfIT, 2002).
 - Between 1999 and 2004, traffic on major roads in rural areas rose by 8.2% (versus 0.8% on major urban roads) and by 7.6% on minor rural roads, compared to 6.4% on minor urban roads (Commission for Rural Communities, 2005).
 - DfT predict that traffic levels could rise by 24-29% between 2000-2010 on rural roads and congestion by 21-30% over the same period (CPRE, 2004).
- 2.2.4 Rural roads are also relatively dangerous. The majority of road deaths are on rural roads, and although casualty rates nationally are falling, this is happening at a slower rate in the country.
- 57% of fatalities in 2005 were on rural roads. (DfT 2006)
- 2.2.5 Rural motorists' overall expenditure is only slightly higher than average, as additional mileage is compensated to an extent by better fuel efficiency.
- Households living in the least densely populated local authority areas spend £58 per week on motoring (equivalent to 16% of total weekly expenditure) compared to £51 (or 14% of weekly expenditure) nationally (CFIT 2001; National Statistics, 2000).
- 2.2.6 Nevertheless, the less well off in rural areas are more reliant on the car than their urban counterparts, suggesting that car ownership can actually be a cause of deprivation, rather than a sign of affluence, because of the large financial burden.
- Households in the least densely populated non-metropolitan areas spend 30% more on motoring than those in more densely populated areas (CfIT, 2005).
 - Boardman (1998) estimates that 12% of rural households would not own a car if they lived in an area with adequate public transport and facilities.
- 2.2.7 Nevertheless, some commentators argue that the impact of high fuel prices rural communities has been overstated (CfIT, 2001; Headicar, 2001; Gray, 2005). Thus

while a small minority of low-income households rural households may be vulnerable to rising fuel prices, the majority cope with fluctuations in forecourt prices.

2.2.8 Increasing car dependence is regarded as undermining rural vitality. Rising car use – allied to wider societal changes in the way that people live, consume and shop – has underpinned a slow decline in the use and availability of rural shops, services and health care, which in turn necessitates car ownership.

- The Commission for Rural Communities (2005) found that there was a decline in the geographical availability of 8 out of 10 services surveyed between 2000 and 2005.
- The number of rural households located within 4km of a bank or building society fell from 66% in 2000 to 60% in 2005, while the proportion living within 2km of a post office declined from 90% to 85% over the same period.

2.2.9 Transport is one of the most important concerns of people living in rural areas, and a number of studies have identified transport as a major barrier to social inclusion in rural areas. While many rural residents are reliant on a car to access employment, shops, health care, banks and even gyms, pubs and restaurants, many without access to a vehicle experience what has been termed ‘poverty of access’ (Farrington *et al.*, 2004).

2.2.10 Dependence on the car is often blamed on a lack of viable public transport alternatives. That said, recent figures suggest that the access to rural bus services is improving significantly after decades of steady decline (Gray 2005). Since 1998, a number of initiatives supporting rural public transport have been introduced in England, worth £80 million a year (The Countryside Agency, 2003). This investment appears to be having a positive impact.

- The proportion of rural households living within 13 minutes walk of a bus stop increased by 5% between 2002 and 2004 (from 80% to 84%; DfT, 2006).

2.2.11 Despite these subsidies, the car is a more important source of mobility for *non-car owners* in rural areas than local bus services (CfIT, 2001) in many areas, emphasising the importance of informal lift giving networks (i.e. family, friends, neighbours and the wider community) in providing access in areas where more formal transport provision is failing to meet demand.

2.2.12 Rising traffic levels also leads to social severance, especially where a busy ‘A’ road runs through a village. Bodies like CPRE strongly believe that rising traffic levels undermine the character of rural areas.

2.3 Rural heterogeneity

2.3.1 The heterogeneous nature of the countryside is rarely considered in analyses of rural transport.

2.3.2 Gray (2005) argues that while it is likely that fuel duty increases may impact on vulnerable low-income groups (e.g. the elderly, the unemployed, young families on low income) in isolated, upland localities such as the North York Moors and Northumberland, the cost of motoring is less critical in more densely populated areas

such as rural Surrey. In these areas, rising traffic levels, and the accompanying problems of congestion, pollution and social severance, are potentially more salient concerns.

- 2.3.3 Similarly, many rural dwellers do have options regarding how and when they travel. The subsidies currently available mean that providing a viable public transport alternative to the car is not always problematic, especially if the rural population is nucleated into discreet, well connected settlements. In contrast, in sparsely populated areas, where households are scattered across a wide area, providing alternatives to the car is often impossible.
- 2.3.4 Gray stresses that different combinations of journey-making opportunities and constraints characterise different localities, households and even household members. Thus any consideration of a new initiative such as national or local congestion charging has to take account of the diverse character of the countryside.

3. Road pricing and congestion charging in the UK

“If someone was to offer to reduce congestion on the roads by 44%, reduce journey times and reduce the amount of traffic by almost 5%, giving us shorter journey times, more reliable, less congested and less stressful journeys, would the British people be interested?” (Oscar Faber, 2002).

3.1 Road user charging: the theory

3.1.1 There are three main theoretical arguments in support of road user charging:

- Internalising externalities;
- Managing the road network more efficiently
- Raising revenue for transport improvements

Internalising externalities

3.1.2 The concept of road pricing is not new. In the 1920s, Arthur Pigou introduced the idea of congestion charging, arguing that *“road users should be charged for their marginal external costs”* (Santos and Rojey, 2002). The Smeed Report (1964) concluded that conventional road taxation methods do not restrain road use at the right time and in the right places and that charging vehicles for every mile travelled on congested roads would *“yield substantial benefits”*.

3.1.3 Pigou highlighted the key economic argument supporting the introduction of road user charging; that motorists should pay the total cost imposed by using the road network (time delays to other motorists, environmental pollution, the cost of accidents, the cost of maintaining the road network, etc), as well as the costs borne directly by the motorists (fuel, their own time etc.). Altering the cost of motoring so that it matches the cost to society is known as *marginal social cost pricing* (Nash *et al.*, 2003; Santos, 2000).

3.1.4 Current fiscal measures (VED and fuel tax) do not necessarily penalise those who impose the greatest cost on society by causing congestion. Mumford (2000) estimates that rural motorists are paying seven times too much in terms of motoring taxation when compared to the social costs they create such as air pollution, accidents and noise pollution. Others such as commuters travelling on heavily congested roads currently pay too little under the current system (CfIT, 2002).

Managing the network

3.1.5 The current system of taxation is also regarded as an inefficient method of managing road traffic and congestion on an increasingly crowded network. It effectively allows congestion to find its own level – this is a kind of ‘do nothing’ approach which revolves around the belief that congestion will itself constrain traffic levels as saturation is reached. This approach does nothing to reduce congestion and can lead to disastrous impacts on the environment (Glaister and Graham, 2004).

3.1.6 As road user charging theory suggests that the road users should pay prices that reflect the marginal costs they impose, those travelling in congested urban areas at

peak times pay more than those using empty roads at quiet times of the day. In theory this has the effect of spreading out traffic flows to produce a substantial reduction in congestion and associated pollution with a negligible reduction in overall traffic levels.

Raising revenue for transport investment

- 3.1.7 The principle of charging to use infrastructure is well established, both in the UK and abroad. Examples include the Dartford Crossing, the M6 Toll and various bridges. In addition, revenue from road charging schemes can be hypothecated for broader transport investment associated with a number of policy goals. In London, revenue from the central London congestion charging scheme has been invested in improving bus services to provide an alternative means of transport to the private car.

3.2 National road user charging: charging structure

- 3.2.1 Adopting many of the recommendations made by the *Road Pricing Feasibility Study* (DfT, 2004), the Government is actively considering the merits of changing the way we pay for road use. Among the measures being reviewed is a national road user charging scheme. Many of the outstanding political and technological issues are still to be debated.
- 3.2.2 One key issue which may have a significant impact on rural traffic levels is the scope, scale and purpose of the charging structure. In terms of the purpose of national road user charging:
- A revenue neutral charging scheme such as that advocated by CfIT in 2002 – where the overall fiscal burden remains the same following the introduction of charging – might be expected to lower motoring costs in rural areas.
 - A marginal social cost scheme, such as that examined in the DfT's feasibility study, would increase the direct costs to motorists as a whole (in return for benefits to the economy and the environment through time savings and reduced emissions) but, again, motoring costs in rural areas might be expected to fall.
 - In contrast, rural motoring costs might stay the same or even rise under a revenue generating scheme, whereby the motoring public is charged a levy to pay for improvements to the transport system or to address environmental concerns.
- 3.2.3 A national charging scheme would involve charges being varied by road and by the time of day. DfT has considered a 10 band scheme, but a more complex and nuanced tariff structure might be required to manage traffic in rural areas (e.g. to manage demand at tourist hotspots or for reduce traffic on busy trunk road rat runs through villages).
- 3.2.4 At the same time Bonsall *et al.* (2004) detected a clear public preference for simple pricing structures. As such, there is a potential tension between the kind of sophisticated scheme which might be required to manage the extremes in demand that exist in some rural areas, and which can be accepted and understood by users.

3.3 Local charging

- 3.3.1 Local schemes will form a test bed for national charging. Certainly in the immediate future a national scheme is unfeasible technologically (and politically), and gaining experience through the implementation and monitoring of a number of discrete charging schemes offers a useful way forward.
- 3.3.2 Shrewsbury is one of the seven towns and cities across the UK to be given a Government grant to look at potential solutions to congestion problems. (Shropshire County Council, 2005).
- 3.3.3 The County Council is currently consulting on a range of initiatives to manage congestion in Shrewsbury town centre, including local congestion charging. Out of 1,200 people surveyed in Shrewsbury, around one third said they would be prepared to accept some kind road pricing scheme if the income was invested in improved passenger services.
- 3.3.4 The Council is considering a cordon scheme (similar to London) for Shrewsbury, with drivers being charged £1 or £2 for entering a central zone at peak times, while people who live in the charging zone might be exempt.
- 3.3.5 If Shropshire County Council do progress a local charging scheme, Defra/RERC could commission a study to examine the 1st and 2nd order effects in the surrounding rural hinterland.

4. 1st order effects: the impact of charging on rural traffic and travel

4.1 Traffic models describing the impact of national road user charging

- 4.1.1 In order to forecast how a national road user charging scheme might impact on rural traffic levels, the findings from three econometric models were reviewed. Specifically:
- The results from the model underpinning DfT's *Road Pricing Feasibility Study* (2004);
 - The modelling carried out by Oscar Faber and NERA for CfIT's *Paying for Road Use* study (2002);
 - Glaister and Graham's modelling work for the Independent Transport Commission (2003).
- 4.1.2 The DfT model was based on marginal social cost pricing, i.e. the overall fiscal burden for all motorists may increase to internalise road users' externalities. CfIT assumed a revenue neutral charging regime, whereby motorists would pay no more or no less overall following the introduction of charging. Glaister and Graham modelled a range of charging scenarios.
- 4.1.3 The models are based on conventional, long established, econometric principles that accord the greatest value to time delays caused by congestion, and place a much lower value on climate change emissions, local air pollution and other environmental impacts, and the cost of accidents.
- 4.1.4 Given the increasing salience of concerns over climate change emissions in particular, it may well be the case that the 'cost' of carbon emissions is adjusted upwards in future econometric models (potentially increasing the overall cost of motoring if a marginal social cost based national charging is introduced). Glaister and Graham modelled such a scenario.
- 4.1.5 The three models also assume a relatively simple charging structure, varying charges with some combination of urban hierarchy, road type and time of day, assuming motorists using the most congested roads at busy times pay a premium, while those using quiet – rural – roads at off peak times pay a lower charge.
- 4.1.6 All econometric models are based on a series of assumptions about how people will react to shifts in price signals, such as whether the value of time will increase in the future, whether the current elasticities of demand will change over time, and whether increasing the cost of motoring will affect the number and distance of trips made. For example, Glaister and Graham's research did not account for people changing the time at which they travelled and did not assume that the overall number of trips made or the overall trip length would change.
- 4.1.7 None of the models were created specifically to examine travel patterns in different rural areas, and each treated rural roads as part of the wider national – and particularly inter-urban – network. As such, and as will be discussed below, the results from these models must be treated with some caution in attempting to forecast how national

charging will impact the countryside. Boxes 1-3 summarise the main characteristics and findings of the three models.

Box 1. Road Price feasibility Study (Department for Transport, 2004). Source: http://www.dft.gov.uk/stellent/groups/dft_roads/documents/page/dft_roads_029788.hcsp

- The DfT work drew on the results of a number of different models; ranging from DfT's National Transport Model to local area models
- It did not make explicit proposals, but served to illustrate the potential impacts and transport outcomes from different types of schemes and charges.
- DfT modelled a number of charging scenarios including full marginal social cost pricing, revenue neutral charging, maximum pricing, applying charges in London and the conurbations only, and simpler schemes where the charges vary by area type, road type or by time of day.
- The feasibility study model most commonly on a 10 'band' *full marginal social cost* pricing regime, with charges ranging from 1.5p a kilometre to 80p a kilometre. Very little traffic would actually pay the highest charges, with half of traffic paying less than it would in fuel duty.
- This is *not* a revenue neutral scheme, as the overall fiscal burden from road users would increase to internalise externalities. However, only a little congestion benefit would be lost if prices were set at revenue neutral levels.
- Society could potentially benefit by up to £10 billion a year.
- Such a scheme would result in a 4% reduction in traffic nationally, with a 46% reduction in congestion.
- *Congestion reductions* would be 51% in Central London and inner conurbations, 46% in outer conurbations and 43% in large urban areas and over 30% in other urban areas.
- *Traffic reductions* would be greatest in central London (21%), then inner conurbations (11%). Traffic reductions of between 1% and 5% would be achieved in other urban areas.

Rural areas

- A distinction was made between rural trunk roads administered by the Highways Agency and other rural roads.
- Rural motorists would pay the minimum charge.
- DfT estimate that traffic would fall by 1% on rural trunk roads, with a 41% reduction in congestion.
- Traffic on other rural roads would fall by 4%, with a 46% reduction in congestion.
- Despite lower motoring costs, rural areas would see a fall in traffic because of a reduction in the number of trips starting and/or finishing in urban areas which would have passed through rural areas.
- Travellers residing in rural areas or small settlements (population less than 25,000) are likely to gain from a reduction in the cost of motoring.
- Travellers in small towns are also likely to fare better, although those in small towns in congested regions such as the South East of England are likely to be worse off.
- People travelling on day trips and for recreational purposes would pay less than they currently pay in fuel duty when travelling to/through rural areas.

Box 2. Paying for Road Use (The Commission for Integrated Transport, 2002) Source: <http://www.cfit.gov.uk/docs/2002/pfru/pfru/index.htm>

- The Commission for Integrated Transport's report was based on work by Oscar Faber and NERA.
- The modelling was based on variable charges, highest for those using congested roads at peak times of day when demand is highest, but no charges where there is no congestion (63% of all travel).
- CfIT also modelled a revenue neutral scheme; motorists in aggregate would be financially no worse off as a result of the charges, but would be better off overall because of the benefits of less traffic congestion.
- Charges would only apply on week days. Motorists on occasional, off peak journeys or those who travel mainly on non-congested routes such as rural roads would be better off.
- Traffic would be reduced by 5% nationally, leading to a 44% reduction in congestion.
- *Congestion reductions* would be 34% in Central London, 35% in conurbations, and 11% or 12% in small urban areas.
- *Traffic reductions* would be greatest in central London (nearly 20%), then inner London (around 16%). Reductions of between 11% and 13% would be achieved in outer London and inner areas of conurbations such as Birmingham, Manchester, Leeds and Liverpool.
- Charging would produce a 2.6% fall in motorway traffic. Average times in charging period would fall by over 3%, and congestion would fall by over a third.

Rural areas

- Rural roads are defined as all roads in rural areas – trunk roads and principal 'A' roads – except motorways.
- Rural motorists who use roads that do not have high congestion levels and who therefore contribute less to local pollution levels, a lower average daytime charge of 1.0 pence per car mile would be levied should congested routes be used.
- The CfIT model predicts that this cost will reduce traffic levels by 2.4%, and reduce congestion by 11%.

Box 3. Transport Pricing and investment in England (Glaister and Graham for the Independent Transport Commission, 2004). Source: http://trg1.civil.soton.ac.uk/itc/tpi_summary_report.pdf

- Work was carried out by Glaister and Graham for the Independent Transport Commission (2003).
- The work modelled the impact of different charging scenarios on flow rates per annum of passenger kilometres over typical roads at a variety of times and places.
- With full marginal social cost pricing (based on low environmental costs), traffic on the network would be reduced by around 9%, with a net increase of road taxation of around £7 billion.
- With full marginal social cost pricing (based on high environmental costs), traffic would be reduced across the network by 19%.
- A revenue neutral scheme would *increase* traffic slightly over the network, with a redistribution of traffic away from congestion times and places.

Rural areas

- Rural roads include motorways, trunk routes, 'B', 'C' and unclassified roads.
- The study suggests that rural areas in England could witness substantial traffic growth of up to 10% under a revenue neutral charging scheme.
- This is based on the assumption that traffic in congested urban areas would be diverted to rural roads which have spare capacity and which could absorb the extra vehicles without a reduction in journey speed
- However, with full marginal social cost pricing (based on high environmental costs), traffic levels would fall in rural areas by at least 2.7% and typically around 6-10%.

4.2 The impact of a national charging scheme on rural traffic

4.2.1 There is a lack of consensus about how a national (or local) road user charging scheme would impact upon rural traffic levels.

4.2.2 It might be expected that many rural motorists – who impose lower social costs in terms of congestion and pollution – would pay less than they do now for the overall cost of their motoring through a revenue neutral or marginal social cost based charging scheme.¹

4.2.3 It might also be assumed that lowering the cost of motoring in rural areas would encourage higher car ownership (at the margin), increase the duration and total number of trips made by car, and influencing journey destination for some activities.

¹ A time and place based revenue neutral or marginal social cost scheme is expected to lower rural motoring costs, although it depends very much on the charging scheme. For example, a revenue neutral scheme designed to achieve climate change objectives through a distance and vehicle fuel efficiency based charge could actually raise the cost of motoring for rural car owners.

With plenty of spare capacity, therefore, it might be expected that traffic would increase, as roads become cheaper to use in real terms.

- 4.2.4 DfT's model, however, indicates that traffic on rural roads would *fall* by 1 to 4%, with a 41% reduction in rural congestion. This appears counterintuitive, as it assumes that reducing motoring costs would reduce demand for road use. The slight fall in traffic is justified by a reduction in trips starting and/or finishing in urban areas that would have passed through rural areas.
- 4.2.5 Similarly, CfIT's earlier study also predicted that a revenue neutral national scheme would reduce traffic levels by 2.4%, and reduce congestion by 11%.
- 4.2.6 In contrast, Glaister and Graham (2003) estimated that rural areas in England could witness traffic growth of up to 10% under a revenue neutral charging scheme. (They also predict that based on higher environmental costs, traffic levels would fall in rural areas by at least 2.7 %.) This is based on the assumption that traffic in congested urban areas would be diverted to rural roads, which could absorb the extra vehicles without a reduction in journey speed. The DfT model also acknowledges that drivers are likely to switch routes to avoid more expensive trunk roads, which would be expected to increase traffic in some rural areas.
- 4.2.7 Thus, depending on the model's assumptions and parameters, traffic could either rise or fall in rural areas following the introduction of marginal social cost (with current carbon values) or revenue neutral charging.
- 4.2.8 It should be noted that these studies did not specifically set out to examine the impacts of charging in rural areas, and the models themselves are not sophisticated enough to reflect of the heterogeneous nature of rural areas. Indeed, it would be logical to expect that traffic might fall in some rural areas proximate to or between conurbations/large urban areas, while traffic grew in other parts of the countryside areas due to a combination of lower charges, falling motoring costs and significant spare capacity.
- 4.2.9 Issues which arise from reviewing these studies are:
- The limitations of macro econometric modelling in predicting the impacts of charging in discrete rural localities;
 - The heterogeneity of rural areas and the fact that charging is unlikely to have the same impact in all localities;
 - The importance of the charging structure and allocation of costs in determining the impact of charging on traffic levels;
 - The need to carry out more detailed comparative work at the micro scale which can feed into national models.
- 4.2.10 The former Countryside Agency emphasised the need to improve existing econometric models to better understand the impacts on travel behaviour and traffic levels in less densely populated areas. Specifically, the extent of re-routing, variation in the value of time and willingness to pay, the incorporation of other travelling responses (changing time, mode or destination) need to be better understood by policy makers.

4.3 Car dependence

4.3.1 If national charging is introduced, reliance on the car might increase if rural motoring costs are lowered, remain roughly the same, or decrease if rural motoring costs rise substantially. Obviously the level and structure of charging is vital, and reflecting the heterogeneous nature of the countryside (see Section 5.6 below), it is likely that elasticity of demand would vary significantly with locality.

Lower motoring costs

4.3.2 Both revenue neutral and marginal social cost (based on low environmental costs) allied to a simple charging scheme might be expected to reduce motoring costs in rural areas leading to an increase in car ownership and some types of car journey (Box 4).

Box 4. Possible impact of *lower* motoring costs on rural car dependence.

- A modest rise in car ownership (rural car ownership levels have already peaked).
- Increasing overall mode share for journeys for those living in deep rural, small towns and some accessible rural areas.
- An increase in the overall number of car journeys starting in rural areas.
- Increasing journey distance for some journeys (i.e. rural to rural, rural to small town).
- An increase in rural to rural and urban to rural journeys.
- A decrease in rural to large urban journeys and a decrease in through traffic.
- Net change in rural traffic of between -1% and +10% depending on locality.
- Possible increase in traffic through rat running in areas proximate to motorways and expensive trunk routes.

Higher motoring costs

4.3.3 Taking account of rising concerns over climate change and rising carbon emissions from road transport, a national charging scheme which aimed to reduce overall traffic levels across the network might actually result in much higher motoring costs, even for rural motorists. It would be expected that this would lead to a decrease in car dependence (Box 5).

Sophisticated rural charging structure

4.3.4 Previous studies have assumed that a relatively simple charging structure with a limited number of charging bands will be used. However, a more sophisticated scheme, with regional or local pricing variations, could be more appropriate for the countryside so that traffic levels could be better managed on busy rural roads, congested tourist hot spots, areas of special interest or that are defined as having valuable rural character.

4.3.5 With such a nuanced approach to charging, the impact on rural car dependence and travel patterns will be more subtle, localised and difficult to predict without detailed research at the micro-scale to inform econometric models.

Box 5. Possible impact of *higher* motoring costs on rural car dependence.

- No change or fall in rate of growth in car ownership in rise in rural areas.
- No increase or even fall in modal share for the car in all areas.
- No rise or a decrease in the overall number of car journeys starting in rural areas.
- No change or decrease in average journey distance for all car journeys.
- No change or a decrease in rural to rural and urban to rural journeys.
- A decrease in rural to large urban journeys and a decrease in through traffic.
- Net decrease in rural traffic of at least 2.7%.
- More modest increase in traffic through rat running in areas proximate to motorways and expensive trunk routes.

4.4 Impact of local charging schemes on rural traffic

4.4.1 It might be expected that a local charging scheme would have an impact traffic levels in the immediate hinterland (Box 6).

4.4.2 On one hand charging may reduce rural-urban and urban-urban traffic through some rural areas. However, the volume of traffic may actually increase in others due to displaced traffic, as drivers seek to avoid a cordoned conurbation or city. Similarly, the number of rural to rural and urban to rural journeys might actually rise.

4.4.3 Again there is little or no previous work on the impact of urban charging on rural traffic levels and these assumptions need to be validated through more detailed research.

Box 6. Possible impact of local charging schemes on rural car dependence.

- No change in growth in car ownership in rise in rural areas.
- No increase or slight decrease in modal share for rural households areas (the most significant reduction for those living in rural areas proximate to cordoned area).
- No rise or a decrease in the overall number of car journeys starting in rural areas.
- No change or slight decrease in average journey distance for all car journeys.
- No change or slight increase in rural to rural and urban to rural journeys.
- A decrease in rural to urban journeys.
- An increase in decrease in through traffic as motorists bypass cordon zone.
- Net increase in rural traffic close to cordon zone. No change or slight decrease in traffic in more remote rural areas or towns on villages on routes linked towns and cities with charging schemes.

5. 2nd order effects: the impact of charging on rural communities

- 5.0.1 The former Countryside Agency and CPRE both recognise the potential benefits of charging schemes for improving access and mobility in rural areas, although they are concerned that the impacts could be significant, depending on the way that the charging scheme is set up and administered.
- 5.0.2 Both organisations are concerned about a range of unintended outcomes from rising rural traffic, especially those generated by the fall in the cost of motoring that might be associated with a fiscally neutral or marginal social cost scheme. Secondary effects might impact on:
- Road safety
 - Public transport
 - Tranquillity, air quality and social severance
 - The housing market
 - Social inclusion and rural vitality
- 5.0.3 In addition, charging is also likely to produce developmental pressures (from the retail and housing sectors) on rural areas, which may further exacerbate (or ameliorate) the second order impacts, discussed below.

5.1 Road safety

- 5.1.1 There is little published literature on the impact of charging on rural road safety. Indeed there is a complex relationship between traffic levels, average vehicle speed and congestion and the number of accidents (DfT, 2004).
- 5.1.2 Wheeler and Taylor (2000) found that reducing traffic speed through physical measures reduced fatal and serious accidents significantly in a number of villages. On the other hand, in London average traffic speeds have increased, but the number of accidents has fallen by up to 5% due the reduction in traffic volume.
- 5.1.3 As noted above, accident rates in the countryside are falling more slowly than in other areas, possibly due to the fact that rural areas are not suffering congestion which reduces average vehicle speed and, in turn, the number and severity of accidents.
- 5.1.4 Much will depend on local conditions and the kind of charging regime that is introduced. A charging scheme which results in rising traffic levels on relatively empty roads might result in an increase in accidents, while more traffic on busier rural routes might reduce average speed leading to fewer or less serious accidents.
- 5.1.5 The converse might also be true, however. A charging scheme which reduces traffic in rural areas might result in an increase or reduction in accident rates depending if the result is lower traffic volumes or faster vehicle speeds.

5.2 Rural public transport

5.2.1 Overall, it might be expected that a charging scheme that further lowers the cost of motoring compared to rural bus and train services would further undermine the viability of rural public transport. However, it is likely that charging might actually boost demand for services in some places, again depending on the charging regime (Box 7).

Box 7. Potential impact of charging on public transport in rural areas.

- Following the introduction of a scheme that lowers the cost of rural motoring, demand for rural-to-metropolitan public transport, such as commuter rail and Park and Ride, is likely to increase where national and local charging schemes are aimed at tackling urban congestion.
- Rural non-car owners are already more reliant on other people's cars than on conventional bus services (Gray et al, in press) rely on bus services. Lower motoring costs further undermine demand for rural-to-rural services (such as rural bus services and community transport) at the margins.
- A charging regime that increases the cost of motoring may well provide a boost for bus services transport, depending on how the scheme impacts on operating costs relative to private motoring costs. Such as scheme would increase demand for rural rail services.
- Local urban charging schemes might be expected to increase demand for rural-urban public transport within a travel to work area. Demand for rural to rural services would remain about the same.

5.3 Tranquillity, air quality and social severance

5.3.1 The increasing weight of traffic already has a detrimental impact on quality of life in some parts of the countryside:

- Rising traffic volumes are regarded as undermining tranquillity and rural character, especially in areas popular with tourists.
- In villages straddling busy trunk routes, the old and disabled find it increasingly difficult to cross the road, giving rise to social severance.
- Local air quality is deteriorating in busy villages.

5.3.2 Charging schemes which lower motoring costs and/or increase traffic flows will exacerbate these problems. Regimes which decrease the cost of motoring and/or reduce traffic flows would help ameliorate them.

5.4 The housing market

- 5.4.1 Congestion charging will act to distort rural housing markets, but the actual effect on house prices will depend on the charging regime introduced.
- 5.4.2 In recent years, a slowly growing population allied to shrinking average household size has created a shortage of affordable housing and driven up house prices. Counterurbanisation and the increasing willingness of commuters to travel greater distances has exacerbated this trend in rural areas, while an increase in lifestyle moves to attractive rural localities has also increased house prices in deep rural areas.
- 5.4.3 Since the second quarter of 2002, median house prices in rural districts have been rising faster than urban house prices (The Countryside Agency, 2004), and given the levels of equity generated in urban housing markets, local house buyers are often priced out of the local market by incomers, making it difficult for the likes of first time buyers and pensioners to buy property.
- 5.4.4 Incomers (especially those who commute) often maintain existing social networks after they move and choose to shop and access services and health care where they work. Urban flight and rising house prices therefore have a wider impact on the fabric of rural life, disrupting the balance of communities, separating families and further undermining the viability rural services. In extreme cases, the local economy may even be forced into decline (The Countryside Agency, 2004).
- 5.4.5 It might be expected that a congestion charging scheme which increased the cost of driving into metropolitan and large urban areas might arrest the increase in those relocating to the countryside to commute. Although some commuters might choose to change the time they travel, choose a different mode (see below) or work at home more often, the net effect might be to relieve some of the pressure on the housing market in rural areas proximate to urban areas.
- 5.4.6 Commuters are increasingly willing to travel longer and further to work by car. A distance based charging regime (aimed at reducing climate change emissions and overall traffic levels) would also be expected to reverse this trend, shrinking travel to work footprint for metropolitan and urban areas.
- 5.4.7 Similarly, charging schemes which increase the cost of motoring across the whole network will reduce the numbers of those moving out from urban areas to commute and reduce the distance they are willing to travel.
- 5.4.8 Schemes which increase the fiscal burden for motorists in large urban and metropolitan areas - might be expected to increase urban flight, resulting in a modest increase in the numbers seeking 'lifestyle' moves to rural areas. Charging might therefore act to increase house prices in attractive deep rural localities.
- 5.4.9 While charging, *in general*, is likely to reduce pressure on the housing market in rural hinterlands, it might be expected that property prices might rise quite sharply in localities proximate to Park and Ride facilities and commuter rail stations, as motorists seek to change modes in order to avoid the highest road charging. Even without

charging, Gibbons and Machin (2003) found that railway stations already have a 'sizeable' effect on house prices, while Pagliara and Preston (2003) found that new transport schemes can increase house prices by around 3% on average. However, additional traffic volume on routes serving Park and Ride sites might undermine house prices on a busy through road, for example.

5.4.10 Substantial investment in Park and Ride, in combination with lower motoring costs, might also act to increase commuting distances, again acting to inflate the housing market in deeper rural areas. Similarly, a national scheme where the cost of motoring was extremely high in London and the major conurbations, less punitive in other cities and urban areas and low or free for rural roads would also act to increase commuting distances in some areas, with an accompanying rise in house prices.

5.5 Social participation and rural vitality

5.5.1 In general terms, raising the cost of motoring in areas where people are constrained in how, where, when, and how often they can travel is likely to further reduce opportunity and undermine social participation.

5.5.2 Correspondingly, a charging scheme that lowers motoring costs in rural areas will increase opportunity and access for the majority of rural dwellers who own their own car or rely on access to someone else's car.

5.5.3 Nevertheless, lower motoring costs are something of a double edged sword. Out of town supermarkets, retail and other services will become more accessible in economic terms, improving social participation for the majority of those who have access to a car. This will act to reinforce existing trends, whereby people travel considerable distances to exercise consumer choice.

5.5.4 Future land use planning policy will be important in ensuring that any market response to the introduction of charging - in terms of the relocation of jobs, shops and services - does not exacerbate existing patterns of social exclusion by further disadvantaging the non-car owning minority or those with limited access to a vehicle.

5.5.5 In combination with changing retail, banking and other practices precipitated by the rise of the internet, lower motoring costs might be expected to accelerate the slow but steady decline in rural shops, services, healthcare, post offices and banks (as noted in Section 2). This will further undermine accessibility and social participation for the non car owning cohort that rely on local amenities.

5.5.6 Many commentators believe that undermining local shops and services undermines rural communities and acts to erode social capital. For example, the former Countryside Agency believes that shops and post offices are often the focus of rural communities and sometimes the only way in which people meet and speak to each other. (The Countryside Agency, 2000; Harrop, 2000).

- 5.5.7 Changing the way we pay for road use is also likely to have implications for existing policies aimed at tackling social inclusion, such as those based on accessibility planning and rural capacity building.
- 5.5.8 Local authorities are required to include measures to tackle accessibility (including accessibility planning) as part of the development of their statutory Local Transport Plan.
- 5.5.9 Accessibility planning seeks to optimise access to employment, shops, services, healthcare, etc. and if necessary reduce the need to travel through support for local services. A charging scheme that potentially *enhances* mobility undermines the viability of, and the support required to maintain, local provision, clearly runs counter to such approach centred on accessibility.
- 5.5.10 Rural policy is increasingly focused on rural capacity building, with those living in rural areas fully involved in developing their community, safeguarding its valued features, and shaping the decision that affect them (Defra, 2003). Such an approach depends on a healthy voluntary and community sector.
- 5.5.11 The relationship between road charging and community capacity building is likely to be complex:
- A charging scheme which lowers motoring costs in rural areas will further undermine the viability of shops and services.
 - A charging scheme that discourages commuting and/or shrinks the journey to work footprint and takes pressure off the housing market might actually help sustain social capital and community networks.
 - Schemes that encourage urban flight to deep rural areas could weaken social capital in more isolated localities (Rural Evidence Research Centre, 2006), loosening long established social networks that are important in facilitating social participation (through informal lift giving, for example)
 - On the other hand, in-migration might generate an economic dividend in such areas; a number of studies suggest that a great many job-creating rural entrepreneurs are in-migrants.
- 5.5.12 Ironically, accessibility planning and rural capacity building – in isolation – would be best served from a marginal social cost charging scheme that increased motoring costs across the whole network or a distance based scheme that encourages shorter car journeys.
- 5.5.13 The accepted wisdom is that these kinds of schemes would be inequitable and undermine rural society, as they would have a disproportionate impact on rural motorist. Also, initiatives which discourage tourism or increase the cost of getting rural goods to market are likely to harm the rural economy in the short term.
- 5.5.14 In terms of accessibility and social participation, changing the way we pay for road use will create new winners and losers, regardless of what scheme is introduced.

5.6 Rural heterogeneity

- 5.6.1 In considering the 2nd order effects of national and local congestion charging, the importance of local circumstances in mediating the impact of charging cannot be overstated.
- 5.6.2 Changing the way we pay for road use *will* have significant implications for rural communities, although the impacts on local journey making – in terms of frequency of travel and mode, destination and duration of journey – will vary from place to place. Second order effects will also depend on the locality and, as will be discussed below, the type of charging scheme implemented.
- 5.6.3 For example, although a national road user scheme might change how and where people travel to work, shop, socialise and access health, there are likely to be substantial differences in the nature and extent of behavioural change between a peri-urban commuter village, a market town and a remote hill farming community.
- 5.6.4 Similarly, there are likely to be significant regional variations; the impact of national charging is likely to be quite different in the North East of England (where a relatively sparsely populated hinterland is dominated by a coastal conurbation), and the West Midlands (where a more complex journey-making relationship exists between competing urban centres and relatively densely populated rural communities).
- 5.6.5 Within a travel-to-work region, local charging is also likely to have implications for the housing and labour markets, the location of retail and economic development, and the viability of public transport initiatives such as Park and Ride.

5.7 Importance of the charging structure

- 5.7.1 Current models are based on marginal social cost pricing, placing emphasis on the value of time and cost of urban congestion. Other road pricing schemes and charging structures could be adopted which emphasise different strategic objectives. Each charging scheme would have its own set of price signals which, in turn, would generate a unique set of distributional impacts, both for rural areas in general and for individual localities.
- 5.7.2 In terms of car dependence, house prices, the viability of local shops, services and health care and the implications for rural policy, a charging regime which increases the cost of rural motoring in order to meet climate change objectives could have a very different impact on rural communities than one which is revenue neutral or based on marginal social cost pricing (Box 8).
- 5.7.3 One - potentially contentious – conclusion is that a charging regime which increased motoring costs might (if pricing signals were strong enough) act to discourage dependence on the car, reversing a long term trend which has fuelled social exclusion for those with limited or no access to a vehicle. As well as lowering emissions across the network, higher motoring costs might benefit rural shops and services, first time house buyers, and those seeking to strengthen community ties.

- 5.7.4 Nevertheless, the car has increased opportunity for rural car owners, and a scheme which raised motoring costs would prove politically unpopular. The former Countryside Agency was opposed to any scheme that adversely affects rural motorists on low incomes, who need to travel locally, while a regime that lowers rural motoring costs might stimulate the rural economy and assist jobseekers. Such a regime would also benefit those who require a car to access shops, services, health care or further education.
- 5.7.5 There is unlikely to be one optimum charging scheme for rural England. A regime which lowers motoring costs will reinforce car use and many of the problems that dependence on the car brings. Higher motoring costs might actually benefit a minority rural communities and/or households, but at significant cost for the majority.
- 5.7.6 One answer might be to consider a differentiated charging structure. CPRE, for example, favours a scheme which varies charges to take account of local characteristics such as tranquillity or outstanding natural beauty, resulting in a much more nuanced price signals. The organisation would also like charging twinned with strong planning policies to manage the damaging effects of traffic on people's quality of life and the character of the countryside.

Box 8. Impact of road user charging: 2nd Order effects

	<i>Lower motoring costs in rural/higher in urban</i>	<i>Higher motoring costs across the network</i>
Car dependence	<ul style="list-style-type: none"> Reinforced 	<ul style="list-style-type: none"> Discouraged
Road safety	<ul style="list-style-type: none"> Increase in accidents on relatively empty roads Reduced average speed and fewer accidents on busier routes 	<ul style="list-style-type: none"> Fewer accidents on empty roads More accidents on busier routes
Public transport	<ul style="list-style-type: none"> Increased demand for rural to urban and Park and Ride services Reduced demand for rural to rural public transport 	<ul style="list-style-type: none"> Increased demand for all public transport
Rural character	<ul style="list-style-type: none"> Rising traffic would undermine rural tranquillity Increased social severance along busy routes Poorer local air quality 	<ul style="list-style-type: none"> Maintenance of rural character
Housing market	<ul style="list-style-type: none"> Commuting by car discouraged, easing pressure on rural housing market in general Rising house prices near Park and Ride and commuter rail stations Increased urban flight to deep rural areas 	<ul style="list-style-type: none"> Commuting by car discouraged, travel to work area compressed further Reduced pressure on housing market.
Social participation	<ul style="list-style-type: none"> Increased car use will increase opportunities for car owning majority Access to local shops, services and health care undermined for 	<ul style="list-style-type: none"> Increased financial burden for all rural households Increased demand for local shops, services and health care, boosting access for some

	non car owning minority • Loss of social capital	• Maintenance of social capital
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5.7.7 There is, however, an inherent tension between the requirements of a simple national charging structure which the public understands and which has simple price signals, and the necessary complexity of a variable charging scheme which aims to manage local traffic in rural areas in order to protect character and tranquillity.

6. Conclusions and further research

“Public attitudes to road pricing can never be regarded as homogeneous. Consequently, geographical, spatial, social, and institutional differences can all represent significant elements in shaping attitudes... There appear to be gaps in understanding the attitudes to road pricing of residents of suburban and rural areas” (Lyons *et al.*, 2004).

6.1 Conclusion

- 6.1.1 Following the establishment of a national road user charging task force, this study was commissioned by RERC on behalf of the Department of Environment, Food and Rural Affairs to consider the potential impact of charging on rural areas. The study has identified possible first order effects such as the impact on the cost of rural motoring and travel patterns, the volume of traffic in rural areas, and second order effects in areas such as housing, accessibility to services, social inclusion and vitality.
- 6.1.2 An extensive review of over 150 papers and websites has generated little evidence-based insight and few answers, and there has been little consideration of whether and how changing the way we pay for road use will play in different localities.
- 6.1.3 Existing modelling studies have not considered the possible impacts on discrete rural areas. Rural roads have been treated as part of the wider national network, and the models have not been sophisticated enough to take account of the heterogeneity of rural areas themselves.
- 6.1.4 Three studies reviewed as part of this project have produced conflicting results, with two predicting a reduction in rural traffic levels of around 1%, and the other predicting a rise of around 10%. This is to do with the different assumptions about national – and particularly inter-urban – travel behaviour underpinning the models employed rather than any specific insight into how travel patterns may change in rural areas themselves.
- 6.1.5 Increasing the cost of motoring to properly reflect the cost of climate change would increase rural motoring costs sufficiently to reduce traffic on rural roads by around 3%.
- 6.1.6 Accepted wisdom, from much of the literature reviewed, is that rural communities will benefit from lower motoring costs if a revenue neutral or marginal social cost charging regime is introduced. However, more recently some commentators and rural agencies have suggested that there may be negative unintended outcomes associated with those identified in the series of questions in section 1 of this report.
- 6.1.7 Questions such as these appear not to have been considered in any great detail in previous work on road user charging. The heterogeneous nature of ‘the rural’ and the fact that many of the debates about the shape, structure and ultimate purpose of charging in the UK have still to take place, mean that it is difficult to make reasonable assumptions about likely first and second order effects from published secondary sources. While some commentators are wary of the potential negative impacts of second order effects, without further research to test a range of charging scenarios in

different types of locality at the micro scale we cannot predict with any degree of certainty what the impacts will be and how they will be distributed across the countryside.

6.1.8 But before we consider the inevitable complexity of such second order effects, we first need to understand better how people are likely to react to different charging scenarios and how their behavioural change will impact on travel patterns in rural areas regardless of trip origin. As the current models make sweeping – but different – assumptions about the role of rural roads in a national transport context, we need to explore how assumptions included in future models may be refined to more accurately reflect the reality of multi-origin trip generation and the heterogeneity of rural areas.

6.1.9 In the light of our consideration of previous models, we have refined the first order questions we need to explore to include the influence of both rural and urban users of rural roads. Key questions which arise are:

- How will people in rural communities themselves react to the imposition of road user charging for different types of journey:
 - Rural to rural
 - Rural to urban
 - Rural to suburban etc
- In circumstances which lead to:
 - Lower motoring costs (possible higher volume of traffic across network)
 - Higher motoring costs at certain times (possible lower volume of traffic or more spread out volume of traffic across the network)
 - Charging in urban areas only?
- How will people in urban areas react to the imposition of road user charging for different types of journey:
 - Urban to urban (implying potential rat running)
 - Urban to rural
- In circumstances which lead to:
 - Lower motoring costs (possible higher volume of traffic across network)
 - Higher motoring costs at certain times (possible lower volume of traffic or more spread out volume of traffic across the network)
 - Charging in urban areas only?

6.1.10 All such questions need to be investigated in a range of localities reflecting the heterogeneous nature of rural areas, in the context of a bespoke study designed specifically to assess the potential impacts of national road user charging in rural areas.

6.2 Proposed design of study

6.2.1 Based on our experience of undertaking projects of this sophistication and magnitude, we envisage a 20 month project employing a full time post doctoral research fellow, and a half-time research assistant. An economist would also be needed for 2 months to inform the development of the questionnaire and to assist in data analysis. The research would be supervised by Dr David Gray (20% time) and Dr Jon Shaw (10%

time) and supported by administrative staff at both the Robert Gordon University and the University of Aberdeen.

6.2.2 Regular progress reviews would be an essential component of the research process and a brief interim report will be produced at the end of month 12.

6.2.3 In the first 2 months, appropriate preparatory work would be undertaken:

- Ensure current literature review is fully up to date;
- Work with Defra and John Shepherd (RERC) to identify case study areas across a range of localities – from urban to deep rural – using the rural definition;
- Work with the DfT (David Knight) to establish a range of credible charging scenarios for testing.

6.2.4 The main data gathering period would be during months 4-12, and include:

- Focus groups to inform the generation of a questionnaire/travel diary research stage (months 4 and 5). Results from the focus groups would augment our existing understanding of the issues derived from the review of the literature and provide insight into the kind of questions we need to ask to better understand the first and second order effects. Focus groups will be conducted in house by the research fellow and assistant.
- Questionnaire and travel diary development and piloting, in liaison with clients and partners (month 6-7). The survey will be designed to address to the range of questions relating to all of the first and many of the second order impacts identified in this report. Primary data regarding travel patterns; expenditure; income; attitudes to, understanding of, and stated travel behaviour responses to, different road user charging scenarios; and so on will be collected.
- Questionnaire and travel diary (months 8 and 9). We would seek clients' views on whether it is better to administer the questionnaire in house and conduct by post (cheaper and reasonably representative sample) or contract out to a market research company (much more expensive but guaranteeing representativeness of sample).
- Data entry and initial analysis of questionnaire and travel diaries (months 10 and 11). As well as generating primary data, the findings will underpin the format and content of detailed semi-structured interviews in each of the case study areas.
- Semi-structured interview schedule development (month 12). The interviews will be designed to explore in substantially more detail the main issues arising from the questionnaire and travel diary, and participants are identified during the questionnaire process. The full range of questions relating to second order impacts will also be investigated in this stage; in particular the interviews will be used to explore how the full range of charging scenarios will impact on decision making at the household level, from small changes to travel behaviour and more dramatic lifestyle choices.

- Semi-structured interviews (months 13 and 14). Interviews would be conducted in house by the research fellow and assistant, and by Drs Gray and Shaw.

6.2.5 Final data analysis and write up would occur during months 15-20.

6.2.6 The estimated cost of such a study would be in the region of £100,000 to £150,000.

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