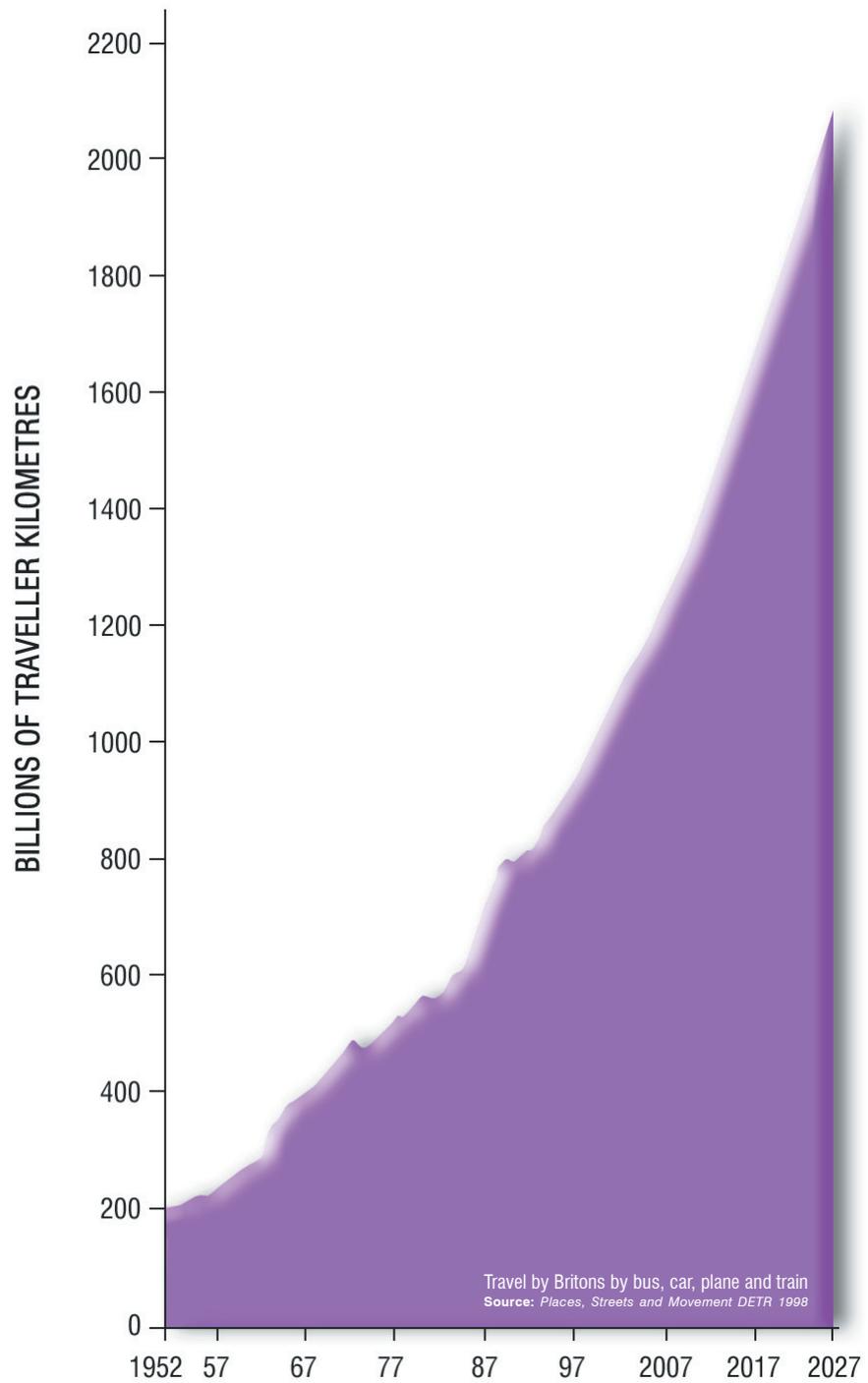


# Road Pricing and Road Investment



## CONTENTS

1	Focus of the research - Sir Patrick Brown	2
2	Context	3
	ITC research	
	Government policy	
	Environmental concerns	
	Traffic congestion	
3	Road charges as indicators of where added capacity could be justified	5
4	Robustness	6
5	Where there could be an economic a case for building new roads	7
6	Roads in tunnels – worth considering	10
7	Summary and Conclusions	11
	Sources	12
	Members of the Commission	Back cover

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## 1. Focus of the research - Sir Patrick Brown

This report considers and analyses the findings of a sharply defined piece of research. The question put by the Independent Transport Commission (ITC) to Professor Stephen Glaister was whether pay-as-you-drive road pricing would, if introduced, remove the need to widen or add to Britain's roads? The answer is a resounding no. (1)

The research does not consider investment in bus and rail services. The Commission takes for granted, however, that public transport improvements would be part of any investment package paid for by road charging.

The Archer/Glaister research report and this analysis of it can be found at [www.trg.soton.ac.uk/itc](http://www.trg.soton.ac.uk/itc).

## 2. Context

**ITC research.** The ITC has been working on road user charging with Professor Stephen Glaister of Imperial College since 2001. In 2003 the ITC showed the effects of a national scheme of road charges on traffic volumes and speeds throughout England. This threw light on the extent of suburban traffic congestion. (2) Last May, following the extension of the Glaister/Graham model to cover Scotland and Wales, the Commission showed how people living in the country would have cheaper driving if the money collected by road charging was kept the same as that with existing motoring taxes. (3)

**Government policy.** During this period there has been a steadily increasing commitment by both government and opposition parties to the principle of charging for road use. The Government's 10 Year Plan 'Transport 2010' of July 2000 reported that: 'The Transport Bill and the Greater London Authority Act provide powers for local authorities and the London Mayor to introduce congestion charging...' The Mayor of London, Ken Livingstone and Durham County and City Councils subsequently made use of them.

Background analysis done by officials for 'Transport 2010', meanwhile, broke new ground by modelling the effects on both congestion and CO<sub>2</sub> emissions of a 'wider take up of local charging powers' and 'limited inter-urban charging'.

The Government committed itself to introducing road user charging in the 2004 Transport White Paper. In an introduction the Prime Minister wrote: 'We must also prepare now for the long term. Over the next 30 years the demand for travel will grow. A report by transport experts, (4) published today, says that national road charging may be feasible from 2014. This could cut congestion dramatically, while reducing carbon emissions. The key is how, not how much, motorists pay for road use.' (5)

The expert report, to which the Prime Minister referred, was a major exercise and explored in detail everything from levels of charge to public acceptability and tolling technologies. (4)

Since then the Government has created a Transport Innovation Fund and in 2005 began to finance research into local road pricing schemes in Tyne & Wear, Durham, Greater Manchester, Shrewsbury, the West Midlands, Bristol & Bath, and Cambridge. Further research grants were recently announced for all these authorities except Bristol & Bath plus the East Midlands, Norwich and Reading.

On the European Continent Germany, Austria and Switzerland have introduced country-wide lorry road charging on their motorways and in Sweden the inner-city of Stockholm has been encircled by a charging ring. In the United States the Transportation Secretary has announced his intention to experiment with pricing in transport 'corridors'.

**Environmental concerns.** This same period has seen a steady growth in awareness of the damage being done to the environment by CO<sub>2</sub> emissions. As anxiety about climate change has increased amongst the public and in political circles, so interest in road user charging has increased with it.

Historic indicators are not favourable. In 1995/7 the average car in Britain did 32 mpg. In 2005 mpg was up to 33. In 1994 cars and vans emitted 22.8 million tonnes of CO<sub>2</sub>. In 2004 the figure was up to 23.8. Forecasts are no better. Emissions of CO<sub>2</sub> from all forms of surface transport which are assessed at 32 million tonnes for 2000 are forecast to be in the range of 31.7 and 33.5 million tonnes by 2020. (6)

Meanwhile the environment has found some unexpected allies. In the United States Arnold Schwarzenegger, the Republican Governor of California, has 'gone green' and found increasing popularity. Research warnings have meanwhile become more emphatic. Sir Nicholas Stern, Head of the UK Government Economic Service, has, for instance, called climate change 'the greatest market failure the world has ever seen' and argued for 'prompt and strong action' to mitigate it. (7)

It should be stressed, however, that road charging, though it would reduce CO<sub>2</sub> emissions by thinning out traffic congestion and smoothing traffic flows, would not alone address all the environmental problems created by motor vehicles. Other actions are needed too. Identifying them was not part of this research but candidates are likely to include land use policies, the promotion of travel by means other than cars, and the development of vehicles which do not emit CO<sub>2</sub>.

**Traffic congestion.** The underlying causes of road traffic congestion are the combination of the use of an increasing vehicle fleet, longer journeys and modest increases in the road network. Between 1995 and 2005 Britain's motorways were lengthened by 251 km. Meanwhile the national vehicle fleet grew from 25 to 33 million. (6)

One illustration of the effect this had on travel speeds can be found in outer suburban London boroughs – places such as Bromley and Hounslow. Comparable figures could be given for all the other conurbations.

#### ROAD TRAFFIC SPEEDS IN OUTER LONDON – 1975 TO 2005.

	1975	2005
AM peak	19 mph	16 mph
Daytime off-peak	26	21
PM peak	21	18

Source: Transport Statistics 2006, Department for Transport

### 3. Road charges as indicators of where added capacity could be justified

Mr Archer and Professor Glaister began by assembling, with help from the Highways Agency, a set of construction costs for various types of roads and tunnels. These were then related to schemes of national road charges designed to reflect the costs of road construction and maintenance plus congestion, environmental damage and safety.

Although Transport Ministers have made many positive statements about road charges, and have quoted some figures, no one knows what drivers might actually have to pay. Scenarios in the government's road pricing feasibility study show the average cost per kilometre, including fuel duty, ranging from 1.5p to 83.5 p with 'very little traffic actually paying the highest charges'. (5) Only time will tell if this is based on well-founded assumptions.

In the absence of a set of officially agreed road charges the researchers examined the relationship between income from road charging and highway expansion costs using two scenarios, one 'revenue neutral' and the other 'revenue additional'. In the first no more revenue was collected in pay-as-you-drive charges than would be produced in 2010 by today's motoring taxes. In the second an extra £16 bn per year was collected. Both are based on forecasts of Britain's roads and traffic flows in 2010. The model, and the scenarios, are described by Professor Glaister in two earlier studies published by the ITC in 2003 and March 2006 (2) (3).

In the 'revenue neutral' scenario, revenue from the charges needed to persuade drivers to change their behaviour was transferred (in the model) to drivers travelling at times when, and on roads where, traffic was lighter. In effect this would mean charging drivers heavily at peak and busy times on inner city and suburban roads, and on ring roads and congested motorways, while reducing fuel duty for those driving in the evening, early morning or in the country.

In the 'revenue additional' scenario, current motoring taxes were projected to 2010, an additional £16 bn was collected in variable road charges, and this new revenue was allocated to general public spending for national and local purposes. Under these conditions the cost of driving would go up in both city and country.

The findings are striking. Irrespective of the scenario, the researchers found that, where there is congestion, road schemes show benefits exceeding costs 'to an extraordinary degree - there are few public investments offering this kind of value for money.' One other significant finding is that, irrespective of scenario, no economic justification could be found for expanding roads in the countryside. (An exception could be intercity motorways.)

## 4. Robustness

Modelling and scenario building are not exact sciences. Some caveats are accordingly given about their data by Professor Glaister and Mr Archer. For instance, the construction costs fed into the model were not from a carefully balanced sample of road projects but from actual contracts entered into by the Highways Agency; the cost of installing a national system of road charges was not included in the calculations; capital and maintenance costs were translated into annual costs in order to provide data that could be compared with charging income; finally the costs attributable to CO<sub>2</sub> emissions can be debated and may be deemed to be too low, or too high. (Their source is work done at the University of Leeds for the Department for Transport.) Notwithstanding such caveats Professor Glaister and the ITC are confident that the findings are robust and have significant policy implications.

So much for generalities. What about the specifics? Where in England, Scotland and Wales might the expansion of the road networks be justified?

## 5. Where there could be an economic case for building new roads

The results are set out below region by region.

**East of England.** In this mainly rural region revenue from charges would exceed the cost of road expansion fivefold along some 336 km of roads in and around towns such as Cambridge, Colchester, Ipswich, Norwich and Peterborough – all with populations of over 100,000.

**East Midlands.** Here investment could be justified by revenues 2.5 to 4.5 times the cost of expansion along 243 km of roads in and around cities such as Derby, Leicester and Nottingham. An even stronger investment case – with revenues at 8.2 times the cost of road building – was found along another 114 km in places such as Grantham and Lincoln.

**London.** Revenue would outweigh the costs of road building by 5.8 to 10.6 times on some 812 km of roads in Greater London while, on another 235 km of roads in the outer London suburbs, revenue would exceed cost ten times. 'This indicates there are serious problems of road capacity shortage in London,' Archer and Glaister say.

**North East.** This region shows, surprisingly, the highest ratio between revenue and costs for anywhere in Great Britain. For 17 km of main roads on Tyneside the revenue could be 20 times the cost of expansion. Over another 56 km of roads in the outer parts of the conurbation the ratio could be 10 to 1. Additional capacity would also be justified on a further 25 km of roads in and around Sunderland.

**North West.** Road pricing revenues, and therefore congestion levels, in Cumbria, Lancashire and Cheshire are 'low in relationship to other regions'. Might this be on account of the region's extensive network of existing motorways?

**South East.** In this region, which includes such counties as Kent, Surrey, Sussex, Hampshire, Oxfordshire and Berkshire, road charges would produce revenues 18.5 times the cost of road expansion on 32 km of very congested routes in and around towns over 250,000, while the ratio of income to cost would be between 4 to 7.5 on 152 km of other roads in places such as Reading, Brighton, Portsmouth and Southampton.

**South West.** A case could be made for expanding the capacity of 272 km of roads in and around towns such as Bournemouth, Bristol and Plymouth.

**West Midlands.** Here the most severe problems were found on 36 km of major roads in and around large cities such as Coventry. In such places revenues exceeded costs by over six to one. Within the Birmingham conurbation itself revenues exceeded costs by over three to one on 184 km of inner city roads and by 1.5 to 1 on another 45 km of roads in the suburbs and places such as Stafford and Newcastle under Lyme.

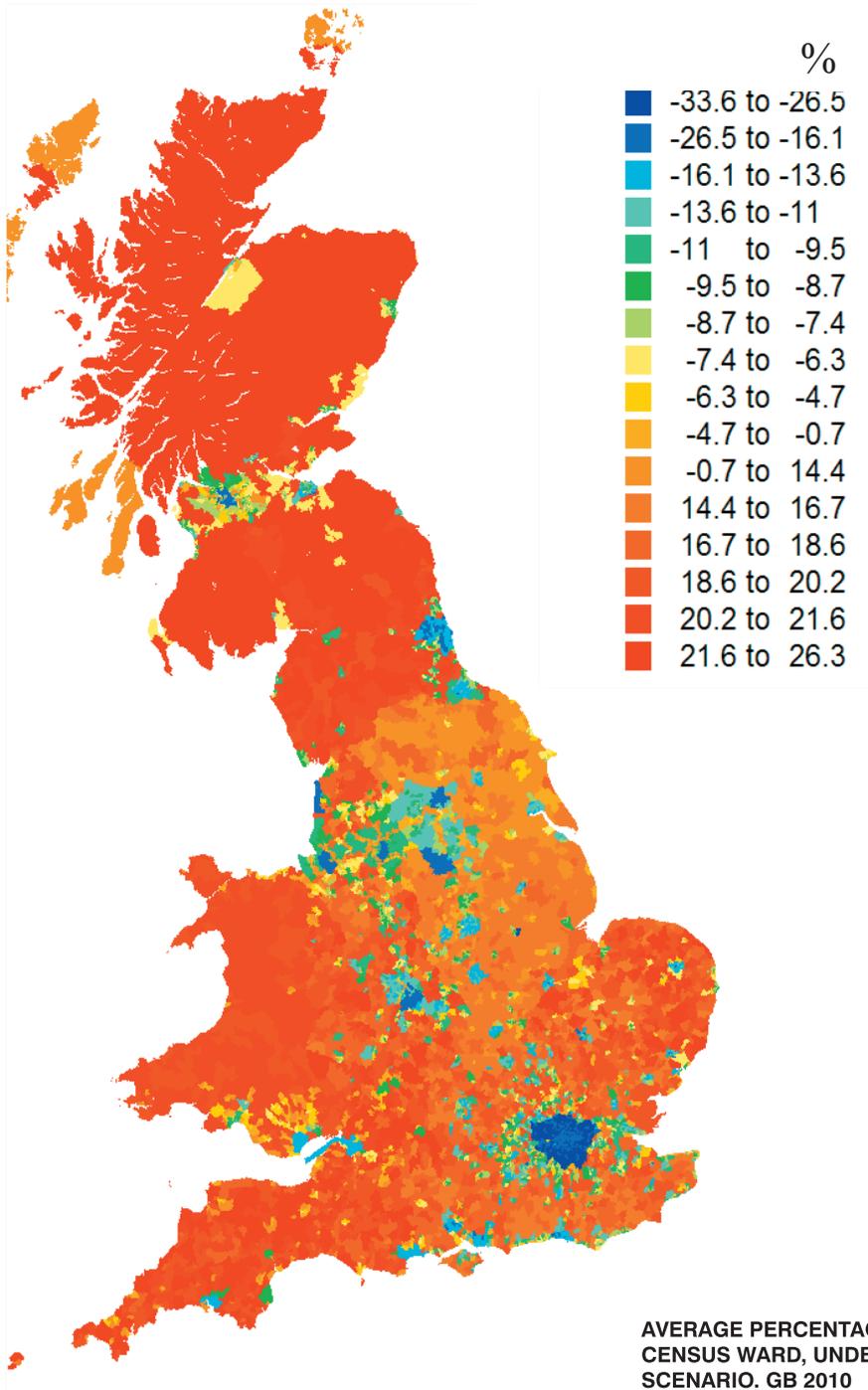
**Yorkshire and Humberside.** There would appear to be a modest case for expansion on 200 km of roads and a stronger one on 19 km of routes in cities such as Bradford, Leeds and Sheffield.

**Scotland.** Severe congestion suggests that increasing capacity could be justified on 29.7 km of roads in Edinburgh while there is a less strong case for expanding 65 km of roads in Glasgow.

**Wales.** Revenues in would justify the expansion of 78 km of roads in Wales – mainly in and around Cardiff.

All the places where there may be a case for building more roads are indicated in the blue tints on Figure 1. These are invariably the inner city, suburban and fringe districts of the conurbations such as Greater Manchester, the West Midlands and Greater London, and of cities ranging in size from Nottingham and Leicester to Lincoln and Cambridge.

If the research points to such suburbs and city fringes as places where there is a case for widening or building roads, it is in exactly the same places, of course, that new roads can be unwelcome neighbours. Might using revenues from road charging to put new and existing roads in tunnels therefore be part of the answer?



## 6. Roads in tunnels – worth considering

Building new roads in fringe of city districts and suburbs is disruptive and usually unpopular. But, where revenue from road charges was high, typically in the same places, the researchers found that tunnels could be an economic proposition and good for the environment. This opens up the prospect of revenue from road pricing paying to reduce noise from traffic in homes and streets, bury ugliness and reduce the dividing of communities. Pricing may thus be a way of upgrading the quality of existing and new roads to a standard fitting the expectations of people in the 21st century. There may be a parallel here with the 19th century shift in practice from building urban railways on intrusive viaducts to putting them underground as invisible metros and subways.

The Transport Secretary recently took this view on a road tunnel past the Devil's Punchbowl on the A3 near Hindhead. The works will include 6.5km of new dual carriageway of which 1.8 km would be in twin tunnels. The cost would range from £347 to £371 million depending on which of four designs is adopted. A start is planned for 2008 with completion in 2011. This underlines the point that, while land costs are avoided, tunnels are up to six times more costly to construct than surface routes and more costly to maintain too. Archer and Glaister are nevertheless positive: '...tunnelling may be a viable solution in a significant number of cases. It can be done for the Channel Tunnel Link....and many other places on the railways so it is worth investigating for roads.'

## 7. Summary and Conclusions

This research answers the question whether, if pay-as-you-drive road charging was introduced, the **economic** case for building new roads would vanish. It shows, by relating the revenues from road charging to the costs of building and maintaining roads, that the answer is a resounding No. Road pricing by itself would not reduce demand sufficiently for Britain's current highways to operate efficiently.

The research did not consider allocating revenue to public transport or, say, to reducing council taxes. The ITC considers these to be important issues but they were outside the scope of this tightly focussed study.

This is, however, the first time that the revenues likely to flow from national road user charging have been related to the cost of providing more roads. The results are both clear and challenging.

- Road charges could provide an accurate pointer to where, and how much, to spend on roads. Just as businesses from BA to Marks & Spencer make investment decisions based on their cash flow from specific services, so road charges would, by revealing the extent of demand to drive **on specific roads**, provide consistent economic indicators about where to widen roads, upgrade junctions, build tunnels or construct bypasses.
- Road pricing, in addition to reducing congestion, would demonstrate with great force the economic case for building roads in some parts of towns and cities. Road charges paid by drivers would, in many cases, more than pay to expand the roads.
- The strongest case for new roads would be within and around the suburbs of such conurbations as Greater Manchester, the West Midlands and Greater London, and in the same parts of cities ranging in size from Nottingham and Leicester to Lincoln and Cambridge.
- In some suburbs and city fringes the income from road charges could be 10 times and more the cost of adding capacity and would justify the building of new roads in tunnels.
- Such tunnels hold out the prospect of reducing noise from traffic in houses and shopping streets, burying ugliness and joining together communities divided by busy highways.
- Professor Glaister says that where there is congestion, road schemes show benefits exceeding costs 'to an extraordinary degree - there are few public investments offering this kind of value for money.'
- With road pricing in place little economic justification could be found for expanding roads in the countryside. (Inter-city motorways could be an exception.)
- The challenge for Britain is to find a way to obtain the advantages of economic growth and of the greater choice in jobs, goods and services which comes with being able to travel, while drastically reducing CO2 emissions. This research makes clear that road charging, and some new road capacity, are parts of the answer.

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