

'Smart M4' – congestion and pollution to rise.

Safer and cheaper to keep the hard shoulder and reduce traffic.

Summary:

The Secretary of State for Transport - Chris Grayling MP – must rule by 3rd September on proposals to create a 'Smart M4' from J3 to J12. It will cost around £860 million to create a 'controlled motorway' including perhaps £500 million to replace 11 bridges to allow 'all lane running' with no hard shoulder.

Evidence from Highways England to the recent Examination into the proposals, drawing on wide area simulations of traffic, shows that:

- the existing wider road system cannot cope with the expected increase in traffic - **average journey time rises** from 36 minutes in 2009 to up to 41 minutes by 2037
- **carbon emissions** from road transport rise by 8% between 2013 and 2037 when the Climate Change Committee's fifth carbon budget says that national transport emissions should fall by 48% between 2013 and 2030
- In 2037 over 4,000 properties will have **night noise levels** above the Significant Observed Adverse Effect Level

Since the Examination closed in March the Transport Select Committee has investigated **safety** of 'all lane running' and concluded "The Department should not proceed with a major motorway programme on the basis of cost savings while major safety concerns continue to exist."

The proposals for 'all lane running' should be rejected to keep Berkshire moving, make the motorway safer, and reduce environmental impacts. A 'controlled motorway' will be safer and add some capacity but government investment should also be used to support public transport and other measures to reduce traffic – not to replace existing bridges.

Details and references:

Modelled area:

Highways England traffic and air quality modelling area is shown in

Congestion:

Highways England acknowledge that the system as designed and simulated cannot cope with projected traffic growth saying "It follows that increases in journey times across the wider network result from the general growth in traffic. The consequences of this growth will be a matter for the local highway authorities to address".

The modelling results and comments are in Section 2.3 on Page 5 of Highways England response to Reading Friends of the Earth

Climate Change:

The Environmental Statement 6-1-ES-Chapters_06-Air-Quality gives assessments of modelled annual emissions of CO₂ at various stages of the scheme in Table 6.19 and Table

6.20. The net effect is an increase of 41 million tonnes per annum over the period – despite anticipated adoption of low-carbon vehicles.

Present (2013)	518,361 tonnes
Without Scheme Opening Year (2022)	497,870 tonnes
With Scheme Opening Year (2022)	539,018 tonnes
Without Scheme Design Year (2037)	509,259 tonnes
With Scheme Design Year (2037)	559,424 tonnes

The Climate Change Committee's fifth carbon budget 'Sectoral Scenarios' report shows in 'Fig 1.7 – abatement to 2030' national transport emissions dropping from 130 million tonnes CO₂ in 2013 to 68 million tonnes in 2030 - a fall of 48%

Noise:

Table 2 of the Enhanced Noise Mitigation Study (Revised) shows over 4,000 residential properties with noise levels expected to be above the Significant Observed Adverse Effect Level. This is 15 dB above the Lowest Observable Adverse Effect Level ("LOAEL") - the lowest level above which adverse effects on health and quality of life can be detected;

Air Quality:

Highways England simulations (locations near M4 only) show air quality marginal +/- to legal requirements in some places in 2022 and show some small adverse changes to 2037 which they claim are 'not significant'.

Counter-argument is that their model assumes Euro 6 standards reduce emissions substantially from 2014 but there is an alternative official model – which they have not used – which would show a worse case.

Safety of All Lane Running:

The Transport Select Committee took evidence from motoring organisations and police and rescue services. Evidence looked at safety implications – including delays in getting emergency services to incidents when there is no hard shoulder and risks of vehicles halting in an active lane.

Their Report, published at end of June 2016, reinforced evidence given to the Examination by Highways England that all lane running, while a little safer than the existing arrangement, was much higher risk than a 3-lane motorway with a hard shoulder and 'Active Traffic Management', and was significantly higher risk than a 3-lane motorway with Dynamic Hard Shoulder Running.

John Booth - 24th July 2016 - www.readingfoe.org.uk/m4

John Walker presents 10 Things Transport Ministers Should Know About Road Pricing



It's a widely held belief that transport ministers have widely failed to grasp the nettle when it comes to understanding the benefits that can be brought about by implementing a road pricing scheme. What follows is my own personal guide that I hope very much will help to rectify the situation.

1. ROAD PRICING IS NOT NEW ¹

Toll roads, on which travellers pay a fee based on vehicle type and distance travelled, are 2,700 years old; tolls were paid on the Susa–Babylon highway in the 7th century BC. Aristotle and Pliny refer to tolls in Arabia and elsewhere in Asia. In Europe, Germanic tribes charged tolls across mountain passes, and the Holy Roman Empire levied tolls in the 14th and 15th centuries.

2. THE RISE AND FALL OF THE TURNPIKE ²



Tolls in the UK were an important source of royal revenue in the past, as well as for road and bridge maintenance. From 1663, in response to local initiatives, Acts of Parliament were passed enabling “Turnpike Trusts”. Trustees were responsible for erecting gates and appointing toll collectors; revenues could be applied only to roads named in the Act - usually existing highways, although new roads were also built, particularly after 1740. (The current UK Coalition Government’s stance is that tolls can be applied only to new roads). Trusts were granted a monopoly (generally 21 years), and those roads were no longer free to use. By 1837 there were 1,116 Turnpike Trusts operating 22,000 miles of roads with 8,000 toll gates.

Although the turnpikes permitted an expansion of trade, they were not always popular – there were the famous “Rebecca riots” in South Wales between 1839 and 1843 in which men dressed as women attacked toll gates, as a protest not just about tolls but about other taxes as well. The toll gates were simply the most visible form of an oppressive taxation regime.

The industrial revolution increased demand for transportation, including expansion in highway networks and better maintenance of heavily trafficked roads. The tremendous increase in economic activity from the mid-1700s could not have occurred without these transport improvements – which were led by the private sector, not by Government. (Another lesson for the 21st century perhaps?) The industrial revolution was supported initially by turnpike roads rather than by the railways, which did not get started until the 1820s, well after the start of the industrial revolution.

The Turnpike era ended for three reasons. First, Trustees were not allowed to



Top: Steanor Bottom toll-house, Todmorden turnpike, West Yorkshire, UK and (bottom) the toll charges displayed Photo:John Walker

just as railroads were being established. Although they were faster, safer, cheaper, more efficient and less damaging to the roadway than horse-drawn carriages and didn't need rails, discriminatory tariffs (six times higher than horse-drawn vehicles) and prohibitions imposed by Parliament, due to political pressure from railway and horse carriage interests, terminated their development. (Perhaps a continuing theme in this decade – HS2 anyone?).

3. EXPORT OF THE TOLL ROAD AND TURNPIKE CONCEPTS



A 19th-century toll booth in Brooklyn, New York.

The UK exported the toll road concept to the United States, where the name “turnpike” is still used. The word comes from a physical gate made from pikes, an infantry weapon with a pointed steel or iron head on a long wooden shaft. It's the inclusion of “turn” that suggests the pikes were the barrier, which could be turned aside about a vertical pivot to allow access when the toll is paid.

4. THE UK STILL HAS MANY TOLLED FACILITIES ³

Despite the demise of the Turnpike Trusts, and highways now in public ownership, the United Kingdom still has several tolled facilities – see table on next page.

Government policy since 1945 is that users, not taxpayers, should pay for estuarial crossings, since they benefit from the cost and time savings from these expensive facilities. Policy since the 1980s is to use private sector expertise and finance to efficiently provide more such infrastructure.

The only Welsh tolled crossing, the Cleddau Bridge, is owned and operated by Pembrokeshire County Council. Remaining tolls on Scottish bridges were abolished by the Scottish Parliament

in 2008 following an Scottish National Party manifesto commitment.

5. ROADS, BRIDGES AND TUNNELS ARE NOT FREE

Contrary to popular belief, roads, bridges and tunnels are not free to use, and they are never paid for. Apart from the initial capital costs, they need on-going maintenance, which often exceeds the original construction costs.

6. UK VOTERS ARE NO DIFFERENT FROM OTHER NATIONAL ELECTORATES

UK voters are no different from other national electorates. No-one willingly pays what is perceived as an extra charge to travel on roads. But when people understand why charges are imposed, and have experienced them, they accept the charges, perhaps as a necessary evil. There is evidence for this worldwide, from the UK (London, Durham), Norway, Sweden, Southern Europe, the United States, Singapore, South America and Australia.

7. TRUCK TOLLING IN THE UK AND EUROPE

Truck tolling is widespread in Europe, even in countries without tolled highways, including Switzerland, Austria, Germany, the Czech Republic, Slovakia, Poland and from 2014 France (the “eco-tax”) and UK.

The UK HGV Road User Levy Act 2013 makes foreign hauliers pay their way on UK roads, and hence improves competitiveness of UK firms. It is a vignette-based scheme, using the licence plate, as read by Automatic Number Plate Recognition (ANPR), rather than a windscreen sticker like the tax disc. From April 2014 the Levy applies to all the UK road network, including Northern Ireland, and to HGVs weighing 12 tonnes and over (260,000 UK HGVs and 100,000 foreign ones). Existing tolls and congestion charges apply in addition.

For foreign vehicles the payments are time based, from daily (£1.70-£10, €2-€12) to yearly (£85 to £1000, €100-

Tolled undertaking	Location	Ownership
Aldwark Bridge	Yorkshire - connecting B6265 to A19	Private - Trustee Management Limited
Clifton Suspension Br.	West of Bristol	Private - Clifton Suspension Bridge Trust
Dunham Bridge	Lincolnshire - A57	Private - The Dunham Bridge Company
Humber Bridge	Kingston upon Hull - A15	Local authority - The Humber Bridge Board
Itchen Bridge	A3025 Woolston-Southampton	Local authority - Southampton City Council
Mersey Tunnels	Liverpool - connecting A5036 to A554	Local authority - Merseyside Passenger Transport Authority and Executive (Merseytravel)
Rixton & Warburton Bridge	Manchester - B5159	Private - The Manchester Ship Canal Company
Severn River Crossings	River Severn	Private Consortium - concession agreement with Secretary of State for Transport - Severn River Crossings plc
Shrewsbury (Kingsland) Bridge	Shrewsbury	Private - Shrewsbury (Kingsland) Bridge Company
Swinford Bridge	Oxfordshire - B4044	Private - The Swinford Toll Bridge
Tamar Bridge/Torpoint Ferry	Truro, Cornwall - A38	Local authority - Tamar Bridge & Torpoint Ferry Joint Committee
Tyne Tunnel	Newcastle upon Tyne - connecting A187 to South Tyneside	Local Authority - Tyne and Wear Passenger Transport Authority
Whitchurch Bridge	Oxfordshire - B471	Private - Company of Proprietors of Whitchurch Bridge
Whitney-on-Wye Bridge	Herefordshire - B4350	Private - Whitney-on-Wye Toll Bridge
Bournemouth-Swanage Motor Road and Ferry ("Sandbanks Ferry")	Across entrance to Poole Harbour between Sandbanks and South Haven Point	Private - Bournemouth-Swanage Motor Road and Ferry Company
Dartmouth-Kingswear Floating Bridge ("Dartmouth-Kingswear Higher Ferry")	Dartmouth, Devon	Private - Dartmouth-Kingswear Floating Bridge Company Holdings Limited
Lynmouth and Lynton Lift	Cliff Railway connecting Lynton and Lynmouth	Private - Lynmouth and Lynton Lift Company
M6 Toll Road	North and east of Birmingham between junctions 4 and 11 of M6 Motorway	Private Consortium - concession agreement with Secretary of State for Transport - Midland Expressway Limited
Cleddau Bridge	Pembrokeshire - across Milford Haven from Neyland to Pembroke Dock	Local Authority - Pembrokeshire County Council



A Central London Congestion Charging Scheme enforcement site (Source: Courtesy of Trevor Ellis Consulting Ltd)

an equivalent sum added back as the HGV RUL charge, so the net result is much the same payment, in a single transaction.

Enforcement for UK HGVs is alongside VED (Vehicle Excise Duty) via the Driver and Vehicle Licensing Agency (DVLA). For foreign HGVs the Vehicle and Operator Services Agency (VOSA) leads enforcement in GB, the Driver and Vehicle Agency (DVA) in Northern Ireland, using targeted enforcement via ANPR and checks at existing safety compliance stops. The Police also have powers to enforce. There is a £200 on-the-spot fixed penalty notice or £300 financial deposit, with up to a £5000 fine or impounding of the vehicle for non-payment.

8. TECHNOLOGY IS NOT A PROBLEM

Several technologies are successfully used, often in combination. The United States uses microwave tags (pictured left) combined with video tolling using ANPR, and is successfully experimenting with GPS and smartphone technology. Germany, France and Slovakia use GPS backed up by ANPR. Austria, the Czech Republic and Poland use microwave tags plus ANPR. London (see



E-ZPass (microwave transponder) lanes at a New Jersey Turnpike

€1200), with rates depending on axles and weight. Payment is electronic via a "Foreign Operator Payment System" managed by a third party contractor, and must be made before using the UK road network; non-payment is a criminal offence. Payment channels include a pre-paid account, BACs, credit, debit or fuel card, or cash. For UK HGVs the existing Vehicle Excise Duty (VED) is reduced by about 50 per cent, with

photograph, left), Stockholm and Gothenburg use ANPR alone.

9. ROAD PRICING IS ENVIRONMENTALLY FRIENDLY


Road pricing addresses pollution as well as congestion and revenue-raising. Charges in the German truck-tolling scheme depend on the emission characteristics of the vehicle, resulting in a cleaner vehicle fleet. The London Low Emission Zone uses the same technology as the congestion charge, and could be extended to private cars, probably at minimal cost.

10. ROAD PRICING IS THE MOST POWERFUL TRAFFIC MANAGEMENT TOOL THAT WE HAVE

As Eddington put it in his report to the British Government in 2006, 'the potential for benefits from a well-designed, large-scale road pricing scheme is unrivalled by any other intervention.'

That view was endorsed by the Department for Transport in 2007 in 'Towards a Sustainable Transport System' which states: 'The Government accepts the Eddington analysis regard-

ing the exceptional case for exploring the potential of road pricing.'

However, we are unfortunately still waiting for action! 


Footnotes


1 Wikipedia

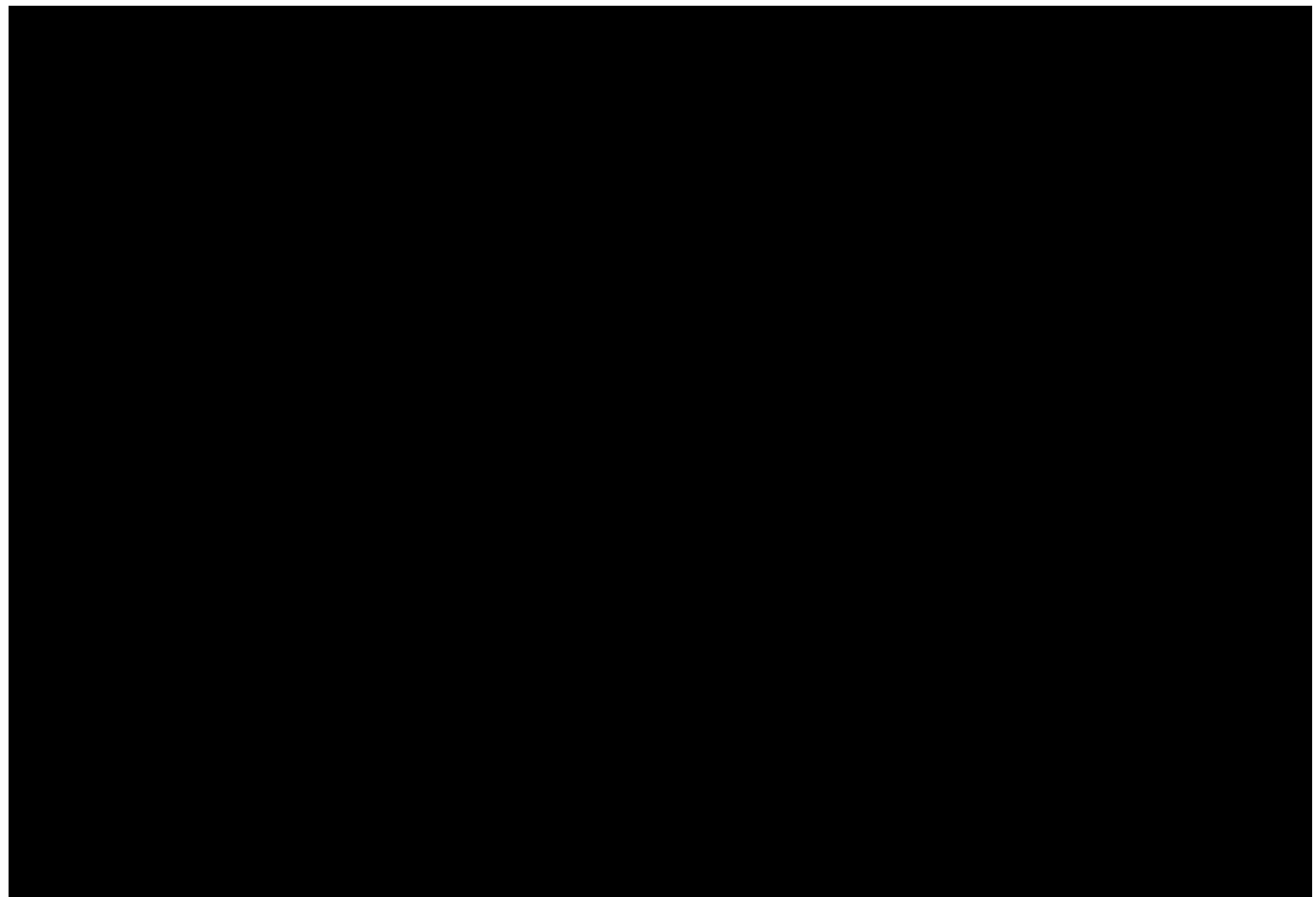
2 Bruce L. Benson (2006), in "STREET SMART: Competition, Entrepreneurship, and the Future of Roads" Edited by Gabriel Roth. Transaction Publishers.

3 "Statutory tolled undertakings in the UK", UK Department for Transport, 19 January 2012



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We can **pay** for better, safer, more reliable roads in a way that is fair to road users and good for the economy and the environment

Readers of this article may recognise a slightly rephrased version of the Wolfson Prize question (Wolfson 2017). The key word in the Prize Question is “pay”. The answer is road pricing (“pay as you go road user charging”); it can support better, safer, more reliable roads, be fair to drivers, and good for the economy and environment. In this article we show how to achieve it.

The problems in road use:

The problems related to road use include:

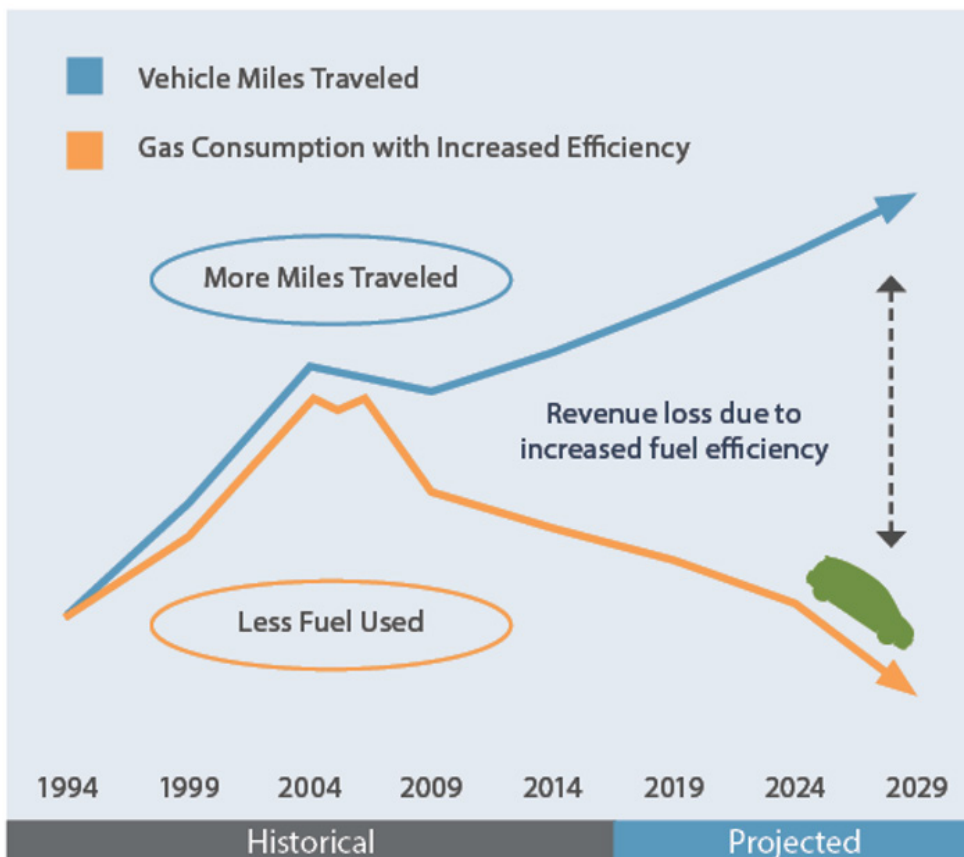
- Roads are congested, especially at certain times and locations (urban rush hours, motorways at Bank Holidays, “pinch-points” on the network), creating estimated annual costs to the UK economy of £13 billion in 2013 and £21 billion by 2030 (Inrix 2014).
- Air pollution, especially NOx and particulates, mainly due to road

traffic, is estimated to cause 40,000 premature UK deaths per year (BBC 2017) – over 20 times the 1,732 reported road deaths in 2015 (DfT 2016a). CO2 emissions contribute to global warming (DfT 2015).

- Revenues from vehicle taxation are declining. The Institute for Fiscal Studies projects annual decreases from £38Bn (2010) to £25Bn (2029), due to improved fuel efficiency and adoption of alternative fuels, equivalent to increasing the basic

rate of income tax from 20p to 23.4p, increasing VAT from 20% to 22.7%, or increasing fuel duty by more than 50% (Johnson, Leicester & Stoye 2012). The fiscal imperative has been given added impetus by the proposed ban on new petrol and diesel cars from 2040. Similar predictions concerning fiscal impacts have been made in the United States (Figure 1).

▼ Figure 1: Fuel Efficiency Contributes to Revenue Loss (Source: California Road Charge Pilot Program)



The solution is road pricing

The solution - the nearest thing to a “silver bullet” - is road pricing. As Eddington said, ‘the potential for benefits from a well-designed, large-scale road pricing scheme is unrivalled by any other intervention’ (Eddington, 2006). The UK DfT agreed in ‘Towards a Sustainable Transport System’ (DfT (2007), stating: ‘The Government accepts the Eddington analysis regarding the exceptional case for exploring the potential of road pricing’.

But how to make it politically and publicly acceptable?

The issue is how to make road pricing acceptable to the public and politicians. Superficially this seems impossible, considering the 1.8 million signature petition against it on the Prime Minister’s website in 2007, and the Edinburgh and Manchester referenda results. However, studies indicate that Edinburgh voters did not understand what was proposed (Gaunt, Rye & Allen 2007), and anecdotal evidence suggests the same in Manchester (Sherriff 2018)¹.

We cite evidence that road pricing is acceptable to public opinion, given certain conditions:

- that it is equitable – which it is, compared to alternatives, especially if it is revenue-neutral or if surplus revenues are recycled into transport. Schweitzer and Taylor (2010) demonstrated that it is less regressive than other taxation, saying ‘we should not subsidise all drivers (and charge all consumers) to help the small number of poor travelers who use congested freeways in the peak hours and peak directions. Rather we should help those who are less fortunate, and see to it that the rest of us pay our own way on the roads’;
- that it does not have high cost overheads; 5% is achievable (Whitty 2018)². This is higher than the cost of collecting fuel duty, though US evidence suggests that such costs are underestimated; but fuel duty has no traffic management or congestion and pollution reduction effects.
- that people affected have experience that road pricing works (Beria, Tosi & Nuccio 2018). Public education and especially public demonstration are necessary.

Counter-intuitive aspects of road pricing

Some aspects of road pricing are surprising or counter-intuitive (Walker 2011):

- People voted to introduce road pricing in Stockholm. Despite initial opposition of 62% of the population, a temporary road pricing scheme demonstrated dramatic congestion reduction, so a majority of residents voted to make it permanent. It is currently supported by 74% of the population, and is no longer a political issue.
- Ken Livingstone was elected as Mayor of London on a manifesto including congestion charging³.
- Significant traffic reductions are achievable with minimal charges. In Stockholm, SEK 10, 15 or 20 (between 87p and £1.74), depending on time of day, produced traffic reductions greater than 20%.
- It does not cause traffic diversion onto other routes, at least not in cities. Minimal diversion was seen in Stockholm and London.
- Provision of improved public transport alone will not get people out of their cars. In Stockholm, extra buses were introduced in August 2005, but there was no effect on road traffic until January 2006 when the Congestion Tax began.

Road pricing technology is proven and in use

The technology to implement road pricing is proven and in use world-wide, mainly using microwave tags, automatic number-plate recognition and satellite positioning. It is improving in performance and decreasing in cost.

¹ As Sherriff points out, in respect of the Greater Manchester Transport Innovation Fund bid “GMTIF was seen by many to be an opportunistic grab of national funding. There is a lesson here for national policy to avoid being counter-productive by expecting towns and cities to develop relatively quick and competitive responses to national calls. There is a related lesson for conurbations to be proactive in developing transport policy strategically, allowing time and democratic space for the involvement of businesses, citizens’ groups and political representatives: far from an appeasement process – which opponents may cast it as – this should be seen as a collaborative development of transport policy and an opportunity to get to the roots of car dependency.

² London, where collection and associated costs, constituted over one third of gross congestion charge revenue in 2016/17 might be seen as an exceptional case, as due to its pioneering role (at least for the UK) the scheme was over-engineered to ensure high levels of compliance.

³ Although so was Boris Johnson on a policy of scrapping the Western Extension. The current Mayor, Sadiq Khan, seems to be ambivalent on congestion charging – and is instead focused on the Toxicity charge.

Singapore has had road pricing in its Central Business District since 1975, an electronic system since 1995, and will upgrade to a satellite-based system in 2019-20. London, Stockholm and Milan all have successful electronic road-pricing schemes, **accepted and voted for by the electorate**, as do many Norwegian cities. Electronic truck tolling operates in Austria, Belgium, Czech Republic, Germany, Hungary, Russia, Slovakia, Switzerland, New Zealand and even the UK (the HGV Road User Levy) - in some cases on all roads, not just motorways.

Road pricing can manage road traffic demand, including differentially at busy times, can charge by vehicle emission class, to manage pollution and encourage cleaner, quieter vehicles, and can raise revenue for infrastructure development.

What are NOT the solutions to the problems of road use

A number of policies are not, on their own, solutions to the problems of road use. Better public transport cannot cope in all the circumstances needed, public transport systems that share road space with the car will get caught up in congestion, whilst public transport systems with dedicated rights of way and pay-as-you go charging will struggle to compete with cars that are perceived as free at the point of use (Duranton & Turner 2009, Ellis 2010). Autonomous vehicles are still decades away from widespread use and may even increase congestion, particularly in mixed traffic conditions (Dft 2016b). More road building can be counter-productive in certain circumstances due to induced demand (Duranton & Turner 2009).

How to make road pricing viable and acceptable

Pointers to making road pricing viable and acceptable, in addition to the ones mentioned earlier, include:

- Education and focus group studies



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► Figure 2: Benefits of the London congestion charge

- as previously conducted by DfT (Owen et al. 2008);
- Behavioural psychology - as yet unused in this area (Kahneman & Tversky 1984).
- Publicity campaigns such as those of Transport for London (figure 2), using conventional and social media, and the use of infographics such as those by the University of California at Los Angeles (UCLA 2017) (Figure 3);
- Ensuring that drivers benefit, as well as other sectors of the community, by making the charging revenue-neutral initially, and combining it with reduced parking charges⁴, concessions, discounts for local residents, exemptions and other benefits.
- Giving drivers several payment options, and ensuring their privacy is protected.
- Implementing High Occupancy Toll lanes in suitable locations, so that drivers experience the benefits.
- Develop road user charging as part of Mobility as a Service packages.
- Modelling of candidate schemes – without a transport model that takes local conditions into account, a system design may create more problems than it solves, by shifting congestion to other parts of the network or by initiating barriers or rat-running within residential areas (Börjesson & Kristoffersson 2014).

Interesting alternatives and potential complements to road pricing are “Spitsmijden” schemes (‘avoiding peak traffic’ in Dutch) (Mouris, Nijhuis & Black 2018). They use similar technologies for enforcement, but differ by paying drivers to avoid certain

⁴ Though this could be counter-productive- especially in terms of land-use, as lower parking charges may encourage more car-dependent development.

⁵ James Whitty, former manager of the Oregon DOT Office of Innovative Partnerships and Alternative Funding, and administrator for its Road User Fee Task Force (RUFF) was involved in various Oregon road pricing trials for at least 15 years, prior to moving to D’Artagnan Consulting, where he is working not only on the Oregon trials but also on those in California, Washington State and Hawaii.



roads or areas during peak hours, and by selecting volunteers to participate in a scheme rather than a blanket approach for all road users.

Conclusions and recommendations

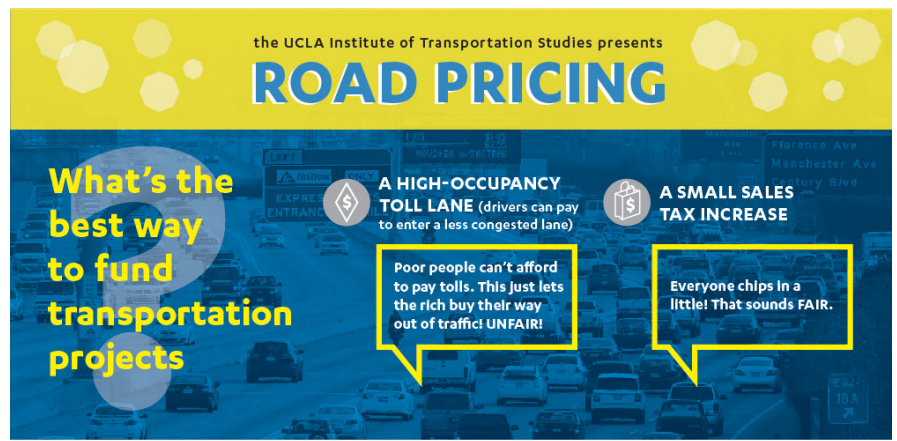
According to Sherriff (2018) we must widen the debate “ .. to make it clear that this is not simply about the ‘driver’ versus the rest of society but about how a diverse range of people access the services they need, breathe clean air, and are protected from the impacts of climate change”. Furthermore “A referendum is an extremely limited way to make such a complex decision, provides no guarantee of the most sustainable or fair outcome, and limits the potential to revisit road pricing in the future. This is not to discount democracy – as opponents of referenda are commonly accused of – but to point out the relative benefits of persevering through existing democratic structures”.

Our view of the future is that road pricing will be adopted widely in

the UK within the next 10-15 years. The HGV Road User Levy will be extended to lighter freight vehicles. And when we as private motorists tax our (electric) car, we will also pay for annual mileage (possibly on a monthly basis), with the charge adjusted in the light of MoT data on actual usage, at the time of re-sale, or, as suggested by Gergely Raccuja (Wolfson 2017), in the premium when we renew our insurance. Our congested cities and strategic transport corridors will have additional charges to use road space related to congestion, perhaps with discounts on public transport alternatives and other added value propositions.

It may take time to change public opinion, and get political support; the sooner we start, the better. According to Whitty (2018) “Widespread, mandated distance charging in the United States is not that far away”⁵. It would be beneficial for everyone if we could say the same for the United Kingdom. ♦

► Figure 3: UCLA Infographic on Road Pricing (UCLA 2017)



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But...how do these taxes affect each of us differently?



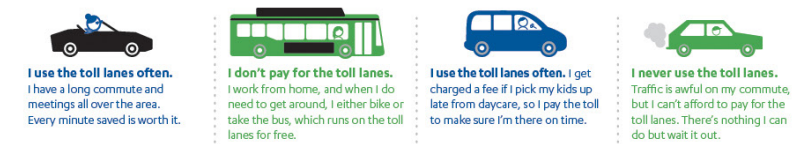
WHAT DO WE BUY?

How much sales tax do we pay?

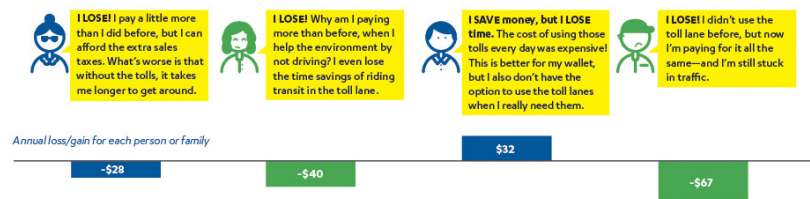


HOW DO WE DRIVE?

Do we use the toll lanes?



HOW MUCH WOULD WE GAIN IN A SHIFT FROM ROAD TOLLS TO SALES TAX?



ANPR as a low-cost alternative to the proposed East Reading MRT

(Observation on East Reading MRT Planning Application: Wokingham - application number 127048; Reading – application number 171108).

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Executive Summary

A limited road charging scheme on the A4 in East Reading at peak hours to reduce congestion, using Automatic Number Plate Recognition (ANPR), is much cheaper than the proposed £24 Million East Reading Mass Rapid transit Scheme (MRT). The capital cost would be around £31k, with annual cost £3k and no environmental disruption or visual intrusion.

The resulting reduction in congestion would reduce delays to buses on this stretch of their route, and improve journey time reliability, as well as reducing delays for other traffic in East Reading.

Integrated ANPR modules cost £5k, plus 4G mobile communications of £30/month, installation £1k-£3k (depending on whether existing poles or gantries can be used), and annual maintenance cost of £300. The existing Reading bus lane ANPR Back Office could possibly be used, or Transport for London may offer to provide this service, as they have offered to for similar schemes in the past.

An ANPR module on each side of the A4 between Cumberland & Amity Roads, and another pair of modules between Liverpool Rd and the A3290 roundabout, monitor east-bound and west-bound traffic; this makes an initial capital cost of $4 \times £5k = £20k$, installation cost of around £8k, and annual running costs (4G communications plus maintenance) of £3k.

Such a scheme could generate income, depending on the charge made, though ideally, especially for public acceptability, it should just be used as a traffic management scheme and charges should just cover the costs of the scheme. A similar scheme in Saddler St in Durham (see figures 1-4 below) which has been operational since 2003 charges £2/day.

An alternative is a Dutch scheme (“spitsmijden” – “avoiding peak traffic”) which involves paying drivers a few pounds per day to avoid the area during peak hours - monitored by ANPR.

The proposed charging scheme, and the “spitsmijden” alternative, both need traffic modelling before implementation, to optimise the scheme, and to decide whether additional cameras are needed on other roads such as the Wokingham Rd and the Kings Rd, plus traffic monitoring during implementation to measure the benefits. Additional cameras would of course increase the cost of the scheme, but even if it works out an order of magnitude more expensive than the £30k quoted above, at £300k it would still be two orders of magnitude cheaper than the proposed MRT at £24 million, and would not incur significant environmental damage or visual intrusion alongside the river Thames.

Introduction

New roads & improved Public Transport do not solve road traffic congestion problems. According to the classic paper by Duranton & Turner of Toronto University (“The Fundamental Law of Road Congestion: Evidence from US Cities”, published in 2009), the total Vehicle Miles Travelled (VMT) is proportional to road lane-miles – in other words, the amount of road space. And building more roads does NOT result in diversion from other roads. Furthermore, the provision of extra public transport has NO EFFECT on VMT.

The evidence from cities such as London, Stockholm and Milan is that the optimal way to control road traffic congestion is to introduce road pricing/congestion charging. Furthermore, the evidence from these and other cities world-wide is that road pricing is acceptable to public opinion, and to voters, provided that:

- it is equitable;
- it is revenue-neutral (i.e. there are compensating reductions in other taxes and charges), or that any surplus revenues (over and above the cost of running a scheme) are reinvested in transport;
- it has a low cost overhead;
- above all that the people affected have experience that road pricing works.

As the authorities in Minnesota and Milan have stated, the best way to get public acceptability is “Show, don’t just tell” and “introduce first, get acceptability later” – the evidence from an existing scheme is far more persuasive than anything else. For much more detail of this see Walker (2018).

Automatic Number Plate Recognition (ANPR) for traffic and congestion management

The price of ANPR systems has dropped considerably over the last 25 years, as is typical with any technology that sees wider use. There has also been a general movement from cameras connected to a controller to integrated units complete with illumination, processing and communications. A typical integrated camera, which can cover up to three lanes, will cost around £4,500.

Typical monthly communications costs per module, using 4G mobile communications, would typically be £30 per month. If there is a hardwired or WiFi communications network already, the communications cost may be zero. Installation cost of each camera module, if it can be mounted on existing street furniture, is relatively cheap and easy (e.g. £600); a new pole and foundation is more expensive (e.g. £3,000). Location and traffic management requirements are also relevant.

Back office costs depend on what method is used – physical server location or cloud based, just data capture or managed service with revenue collection. It could be as little as £10k, especially if it can use the existing Reading bus lane enforcement back office, or as much as £200k if implemented from scratch. An alternative would be to subcontract it to an existing road user charging back office such as Transport for London’s; TfL have offered this service in the past.

Other costs would include annual maintenance & support (typically £300 per year per camera), Scheme Design, Project Management, Integration with existing systems, Legal advice, Signage regime etc. These are difficult to quantify in advance but are unlikely to cost anything like as much as the MRT at £24 million.

European number-plates – of which there are probably not very many in Reading - tend not to be a problem, as long as they aren't caked in dirt and are in the correct format.

Calculations for East Reading MRT

So Capital Cost would be say £5k/module, with average installation cost of say £2k, making £7k per location, and annual running costs of £300 pa per module or site – say £3k in total.

Back office costs are difficult to assess at this stage, depending very much on whether the existing bus lane monitoring scheme could be adapted and used.

Eastbound and westbound traffic along London Rd

It would seem that a camera system on the A4 between Cumberland Road & Amity Road, and another between Liverpool Rd and the A3290 roundabout, would be sufficient to monitor out-bound/eastbound traffic, with a similar pair at the same locations to monitor inbound/westbound – a capital cost of $4 * £5k + \text{installation at } £8k + \text{£3k annual running costs} = £31k$ would seem to be adequate, in addition to whatever the Back Office might cost.

There would also need to be targeted road traffic monitoring during the implementation phase to measure the benefit and gauge whether changes to traffic require further action.

Such a scheme could generate revenue, though ideally, especially for public acceptability, it should be used only as a traffic management scheme, with charges just covering costs of the scheme.

A similar scheme -Saddler St in Durham

A somewhat similar scheme has been operating in Saddler St in Durham since October 2002 - it was in fact the first congestion charging zone in the UK, predating the London scheme but covering only one street in the centre of Durham. It originally used rising bollards to control access but these were replaced by ANPR in 2011. See figures 1-4. It currently charges £2/day.



Figure 1: Saddler St in Durham



Figure 2: Access to Market Place and Saddler St



Figure 3: Sign indicating entry to charging zone



Figure 4: Signs indicating entry to and exit from the charging zone

Potential problems with the Reading scheme

With locations like Saddler St in Durham, motorists have the option not to drive up it. But in the case of the London Rd in Reading, inbound and outbound traffic, apart from changing the time of travel, has only the Wokingham Rd as the alternative route. So it may be necessary to have cameras on the Wokingham Rd just east of Cemetery Junction – and similarly on the Kings Rd just west of Cemetery Junction. This would increase the cost of the scheme, but even if it works out ten times as expensive as the £30k quoted above, at £300k it would still be only around one hundredth of the cost of the proposed MRT at £24 million. And in a larger scheme there would be potential economies of scale; a small implementation has a disproportionately large cost to set it up and manage it.

“Spitsmijden” (‘avoiding peak traffic’)

An interesting alternative technique to address traffic congestion is “spitsmijden” (‘avoiding peak traffic’): motorists, rather than paying to drive, are paid NOT TO DRIVE, at certain times (especially peak hours) and locations (such as roadworks). Used only in the Netherlands so far, “Spitsmijden” projects have been shown to be an effective and cost-effective congestion reduction measure, using small payments of **between 1 euro and 6 euros per day**. Especially during large road construction works, Spitsmijden projects can significantly mitigate the negative effects of capacity reduction and increased travel time, and the effects may persist long afterwards. They can also be used to alleviate

recurrent congestion on roads, either as an alternative to, or in advance of, road charging schemes. Spitsmijden seems to work well for such localised areas; whether it would work equally well on a larger scale is yet to be determined.

For more details of “spitsmijden” see chapter 20 of Walker (2018)

Recommendations

The proposed charging scheme, and the “spitsmidjen” alternative, should be investigated thoroughly before any MRT scheme is implemented, modelled using suitable traffic models, and monitored during implementation, to ensure that the scheme is optimised; badly designed schemes may make congestion worse.

Such schemes would not only be much cheaper but would not incur significant environmental damage or visual intrusion alongside the river Thames, unlike the MRT. The reduction in congestion would reduce delays to buses on this stretch of their route, and improve their journey time reliability, as well as reducing delays for other traffic in East Reading. And they would leave open the possibility of proceeding with the MRT subsequently in the unlikely event that they are found not to work.

References

Duranton G & Turner MA (2009) “The fundamental law of road congestion: evidence from US cities”, Working Paper 15376, <http://www.nber.org/papers/w15376>, National Bureau Of Economic Research, Cambridge, MA 02138, September 2009

Walker, J (2018) "Road Pricing: Technologies, economics and acceptability". Published by the Institution of Engineering and Technology, February 2018. The contents of this book can be viewed at <http://www.theiet.org/resources/books/transport/rdpri.cfm>

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