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So what have we learned?

As London celebrates the 5th birthday of its congestion charging scheme, ANDREW PICKFORD takes a look at recent progress made in developing real-world congestion charging solutions worldwide and current trends to see how much we have really learnt about pricing for the use of roads in our towns and cities

Happy Birthday, London. On 17 February 2003 the London Congestion Charging scheme went live.

The primary target, to reduce congestion, was rapidly met. Decreases of up to 26 per cent (now about 21 per cent) from pre-launch levels were reported by the charging authority, Transport for London (TfL) and the overall net income from the scheme, to be fed into complementary transport measures, rapidly surpassed £100m (€130m) per year and is now over £125m per year. Five years later the scheme area has been extended westwards to roughly double its original size and various refinements have been made to its charging policy.

According to TfL 50,000 fewer cars per day are being driven into central London – not a reason to claim that the same number had been ‘priced off the road’ though. London’s buses carried over 1.9 billion passengers in 2006/07, an increase of 45 per cent from 1999/2000, induced in part by the charge itself and through increased investment in new buses. No charging policy would be aimed at reducing the wealth-creation ability of a region so it is notable that the net reduction in the number of people entering the centre of London was about 4,000 in 2003. This is a small proportion of the 20- 25m daily journeys that were made during the same period.

Whether or not you will be celebrating the congestion charging scheme’s fifth birthday, it is clear that the arguments for and against the application of road user charges to reduce congestion in other cities worldwide are as intense and as healthy as ever five years on.

The distribution and nature of benefit received or cost incurred depends on who you are. Owners and drivers of many vehicles are required to pay the charge in return for a more reliable and reduced journey time - on average - according to periodic surveys.

Paying a fee to drive into a charged area does not provide the same level of visual and instant gratification received by paying a toll to cross a bridge over the Thames, San Francisco Bay or a tunnel under Hong Kong

Harbour (or any one of hundreds of crossings and tunnels worldwide).

Congestion charging and its big brother, national road pricing, forces a more challenging set of questions even before I get into my car. What benefits would I receive if I paid the charge? Should I drive at all? And if so, when should I travel? What other modes are available to me?

Taking Stockholm

Stockholm City’s strategy to make the benefits and the costs visible to business and individuals was to install a pilot congestion charging scheme encircling the city. The trial ran for seven months from 2006 and not only highlighted the effect of a charge on congestion but also showed what would happen if it was turned off. Unsurprisingly, traffic levels quickly returned to a level close to pre-charging levels.

Following the pilot and a referendum that demonstrated, by a slim majority, support for congestion charging, the scheme was turned back on, with many operational refinements, on 1 August 2007.

This on-off experiment was not unique, however. Trondheim in Norway suffered from a 10 per cent increase in traffic within six months and correspondingly reduced investment in bus network subsidies since its cordon toll scheme was turned off on 31 December 2005. Restoring the cordon scheme is now back on Trondheim’s political agenda.

Most of us are creatures of habit - individuals often impose upon themselves, over time, routines that are largely fixed and often dependent on the routines that are established by others. These self-created routines evolve through choices that we all make; the schools to which we send our children to, the places that we work and go shopping. Or, as businesses, we expect employees to be available at generally fixed hours, we expect our goods to arrive just-in-time to be used on manufacturing lines and we do not expect to pay more to move goods by roads than our businesses already pay through



Londoners are reminded that they don't have to drive to work

other means. The value of time, or rather the opportunity cost of sitting in congestion is often not factored into this logic though.

An assessment of the marginal social cost of congestion is unlikely to be on our individual agendas unless we happen to be a transport economist, of course.

So, implementing congestion charging (or just talking about it) makes us question historic decisions and the logic of our embedded behaviour. It also questions whether we, as individuals, are equipped with sufficient information to make a rational decision based on the collective cost of congestion, including the adverse impact on the local economy, health and its contribution to the generation of emissions harmful to the environment.

Making an informed decision at a local level needs not only a 'leap of faith' but a full understanding of the benefits to at least the same level of awareness as the charges that, unsurprisingly, seem stick more readily in the collective memory.

Embedded decisions

But exactly how embedded are the transport choices that we make? One of the most surprising findings of the Stockholm pilot was that the expected level of behaviour change (measured by traffic patterns and modal shift) happened faster than predicted. Over 80 per cent of expected migration from peak period to off-peak and public transport modes occurred in three weeks rather than the expected three months. In this case the travelling public and business were more flexible than some of the early surveys had predicted.

This suggests that enough road users were able to modify their travel behaviour such as the time of travel or choice of mode to reduce congestion to published target levels - about 20 per cent compared with pre-charging levels. This success also hides another economic truth - increasing a charge does not necessarily reduce vehicle movements (and its near relation - traffic

congestion) in proportion - as shown by the reduced impact of raising the nominal charge in London from £5 to £8. In effect the demand is becoming more and more inelastic as pricing stimulates more and more road users to seek alternatives.

This does not undermine the logic of congestion charging though but demonstrates that pricing can only be regarded as one tool in the transport policy-maker's toolbox. For example the Singapore Land Transport Authority (LTA) has applied charges that vary monthly since 1998. Although not urban congestion charging, varying the charge to maintain a specified level of service has been applied on SR91 in California since 1995.

A solution for smaller cities

It may be no coincidence that some of the global pioneers of congestion charging are large cities; Singapore, London and Stockholm. However, the challenge now is not to replicate the London scheme or even Singapore but to find local solutions, particularly for smaller cities and towns where the benefits and costs of congestion charging also warrant going ahead with a scheme. Regardless of the benefits, the short-term financial model still needs to stack up though.

Simply, the price charged for road use needs to exceed the costs of charge collection and scheme operation. It must exceed it, over the long-term, by an amount that supports the complementary measures needed to help 'lock in' a change in user behaviour, including an improved public transport network and improved public information on travel options before and during a journey. Of course, reality is more complex than this.

For example, if the charge required to induce a behaviour change to meet congestion charging limits is low then it may not be enough to cover costs and meet financial targets to invest in projects such as park and ride (Stockholm), increased bus provision (London) or the proposed fare freeze on public transit (New York).

Furthermore, as national pioneers the London and



The BBC opened the airwaves for a Congestion Charging debate in 2003 (left) while (right) a taxi, which was and still is exempt from paying the charge, passes a Central Zone sign 10 minutes after the scheme went live

Stockholm schemes were developed in isolation of other local schemes, in other words, all of the functions required for congestion charging have been provided (or procured) from within. Figure 1 (on page 50) highlights the functional complexity of a typical charging scheme based on the application of charges on a public road network.

The figure assumes that many vehicles are equipped with some means of recording road usage such as using Dedicated Short Range Communication (DSRC) tags or, in the future On Board Units (OBU) that employ Global Navigation Satellite System (GNSS) to identify the vehicle's position on the road network and Cellular Networks (CN) to communicate vehicle journey information back to the same charging authority. It is assumed that enforcement does not depend on barriers to limit vehicle access but instead depends on image data as primary evidence of the vehicle's presence at a specific time and place.

To be useful, the images captured need to show the vehicle's number plate (interpreted by Automatic Number Plate Recognition, ANPR) and other context data. Figure 1 also shows the variety of payment channels that would need to be offered to enable broad accessibility, including the option to pay cash through retail outlets.

Where the investment in tags to ensure automatic charging is not justified based on usage then video-based accounts could also be offered at higher operational expenditure for each chargeable event. The lowest usage customers or those that travel very occasionally would be able to register for individual journeys, enforced entirely by cameras.

International charging schemes such as the City Link in Melbourne (Australia), ETR 407 (Canada) and Highway 6 (Israel) offer a variety of account types matched to predicted road usage of individual account holders and several payment channels to maximise accessibility and compliance.

Joining the club

An urban charging solution does not need to develop all of these functions but could have access to some of them from third parties; either other charging authorities with spare operating capacity or specialised providers. Having the choice between buying services from a menu or developing internally may be the key to joining the club.

How could a smaller scheme take advantage of the benefits of scale and define a business case that is sustainable and generate sufficient funds for complementary measures such as enhancement to public transport? If we cannot answer this question, then congestion charging will remain an elite group to which only large cities can afford to participate.

The introduction of congestion charging can no longer be justified solely by social benefits and costs but on having an operations cost structure that works at a smaller scale to return enough of the revenues collected to be invested elsewhere. The same is true of toll schemes such as the Oslo Ring that had, as its primary target, to fund the building and maintenance of a cross-city tunnel. The bankable surplus of revenues over costs for this charging scheme meant that the tolls are still being applied even after the initial investment needs had been satisfied.

Norway has implemented 22 charging (toll) schemes, including six cities all of which are socially and economically justified. Although the strategic objectives of these toll schemes are not aimed at reducing congestion it demonstrates that small scale solutions can be delivered through the development of proven operating models, proven legislation, single account interoperability, an educated and competitive local supply chain, agreement on inter-operator data exchanges, centrally delivered guidance and common functional modules. Pioneers carry a disproportionate implementation risk – being a follower is not such a bad thing if this risk is reduced.

London

The basis of comparison between schemes is no longer costs as a proportion of revenues; costs reflect the underlying complexity of the organisation and its operating volumes whilst revenues reflect charging policy requirements. So, as the number of schemes increases the maturity of service providers' solutions, as pricing for bought in services becomes more competitive and predictable, as legislation is refined and as greater awareness of the costs and benefits of congestion charging are known, then the scale at which the business case enables congestion charging should fall.

This will not only enable small city solutions but allow policy evolution at lower cost since this will depend less on the activity of the charging and enforcement services. However, the challenge remains regardless of scale - to ensure that the benefits of charging for road use remain local, direct and visible.

In the last few weeks, Geneva, Dublin, Gothenburg and Helsinki have all announced the prospect of congestion charging. Even Brunei and Monaco have announced their interest. San Francisco is part way through a study and Los Angeles amongst several other US regions will bid for funds from the Urban Partnership and Congestion Reduction Demonstration (CRD).

The end game?

Just as we are seeing congestion charging appearing on political agendas we are already seeing new charging policies emerge. Milan turned on its EcoPass 'pollution charge' on 2 January 2008 for a 12-month trial. Rome imposed limits on the most polluting vehicles later in January and Turin is considering introducing an emis-

sions-based charge. Other cities are considering access schemes where only authorised vehicles and those that pay a period charge would be permitted access. London is not standing still and, although congestion charging is part of the fabric of London's transport strategy, it continues to evolve further. On 4 February 2008 London turned on its Low Emission Zone for heavy goods vehicles driving into and within the most of the Greater London Area. Furthermore, in November this year, plans have already been made to extend the original scheme with an emissions-related charge.

Paying for road use in our towns and cities is no longer only about congestion but also about air quality and other policy objectives. The goalposts are moving and reflect potential new trends planned to be implemented in London and New York - among others.

The next article in this occasional series will be entitled 'Ten Years On' - a review of progress and what we have learnt about urban congestion charging and its many policy variants. Only time will tell how well this increasingly complex policy environment has been translated into understandable policies that are cost-effective to operate.

The subject of charging for road use forces us to think more about travel choices. This is perhaps why congestion charging and its big brother, national road pricing, are not subjects that are most likely to break the ice at parties - at the moment at least. ■

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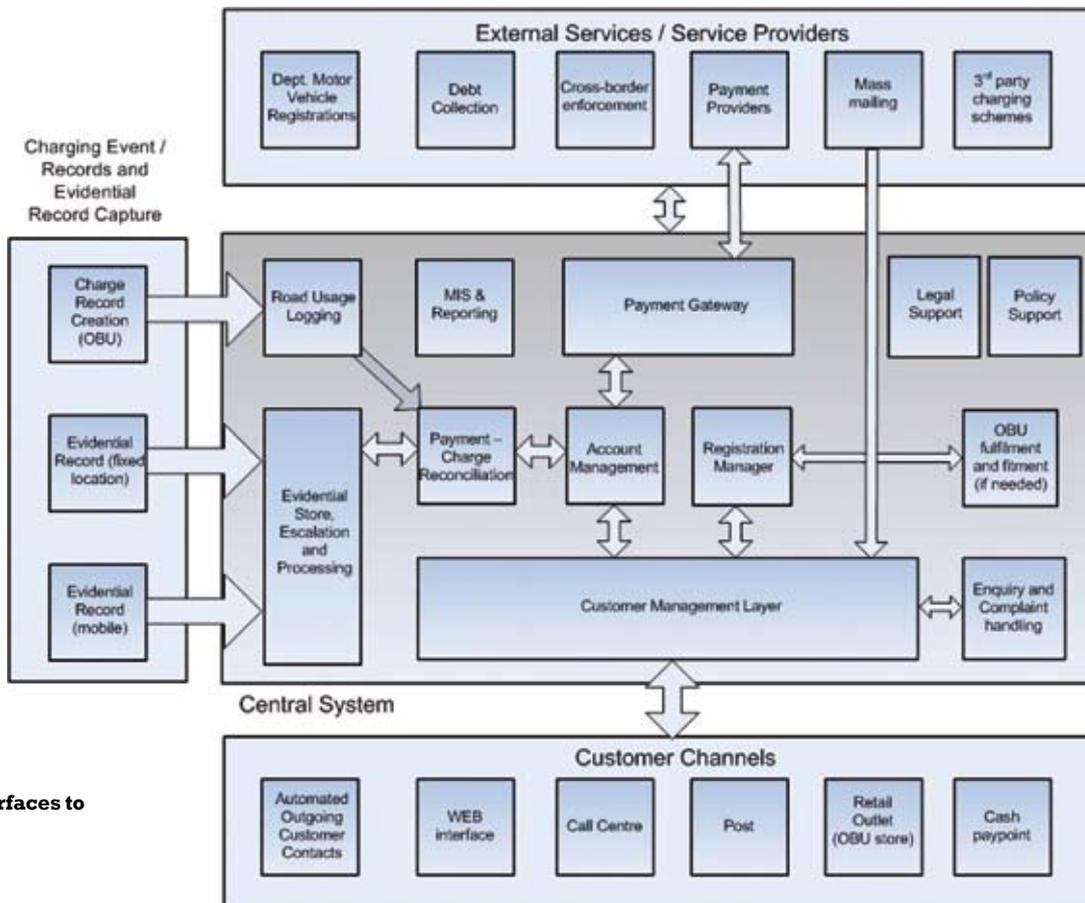


Figure 1 Interfaces to stakeholders