

# Going the distance: the end of fuel tax

**Andrew Pickford** examines the future of a usage-based tax that has been with us for 80 years: fuel tax, conceived in an era of post war introspection and when the Ford Model T was considered innovative

Over the last decade the independent but collective long-term impact of global warming, the advent of mass-market alternative fuel vehicles and the increasing scarcity of public funds are pushing us inextricably towards a re-evaluation of transport-related taxation, fees and tolls. Since 1987 when the world's first commercial use of electronic toll collection was demonstrated, we have seen an explosion of new policies for road user charging, including truck tolling, electronic road pricing, low emission zones and congestion charging. Their limited but growing success enables rebalancing of usage fees to meet 21st century policy agendas – and could this enable the start of the end for fuel taxation as we know it?

## IN DEFENCE OF HISTORY

To quote Neils Bohr, “prediction is very difficult, especially about the future” but I expect that no-one could have forecast that fuel tax would be around for 80 years since it first came into ‘popular use’ in the early 1930s. In the US it was introduced as part of a package of taxes to balance the budget and to fund public works projects in order to boost the American economy. Fuel tax is efficient to collect, typically about 3 to 5 per cent of revenues collected, and for consumers, it is applied at the point of sale. The amount of tax collected depends upon consumption rates that are directly linked to vehicle fuel efficiency and distance driven.

In OECD countries, as GDP varies so does fuel consumption, with a positive correlation in excess of 0.95, according to the US Energy Commission. Fuel

efficiencies and CO<sub>2</sub> emissions are also improving, stimulated by two sources; firstly federal emission reduction requirements in the US (and elsewhere) and secondly by the increasing purchase price of fuel itself (part of which is tax). The same drivers are also helping propel the commercialisation of alternative fuel vehicles, expected to represent the majority by 2025. China is the now the world's largest manufacturer of vehicles and starting to set standards in emissions reduction, encouraged by local measures such as Shanghai's plans to provide a subsidy of RMB2,000 (€240) per kWh (of battery capacity) up to RMB100,000 announced in January this year.

So whilst no-one would wish to recommend economic recession as a solution to traffic congestion, fuel taxation is becoming an unreliable source of revenues to fund public works programmes and other general costs. Despite its obvious shortcomings though, fuel taxation has undoubtedly secured significant political support, which makes it difficult to challenge – but will there be a point at which classical taxation policy based on oil-derived fuel is seen as ‘broken’ and how close are we to this?

## IN DEFENCE OF CHANGE

Depending on your historical bias, the introduction of road user charging in the form of tolls preceded fuel taxation by a few centuries, generally manifested as access fees for new routes and to allow early travellers to benefit from added value services, including a safer route and a more predictable quality of road surface.

Since then, the application of tolls to new routes has mostly been a global



*“Although no-one would wish to recommend economic recession as a solution to traffic congestion, fuel taxation is becoming an unreliable source of revenues”*



**A congestion-free Utopia may just be achievable with the intelligent implementation of road user charging schemes**

policy success as each road user is able to associate local visible benefits such as being able to access a road, bridge or tunnel with a local cost (the toll paid). Electronic Toll Collection (ETC) has reduced the cost of tolling and increased user convenience. However, applying charges on existing congested routes to guarantee the delivery of more consistent journey times in the form of congestion charging has been a harder sell – even in schemes that have been implemented successfully (such as in London, Stockholm and recently Gothenburg) and the many casualties that never reached the final hurdle. Asking each road user to take a leap of faith and to quantify the cost saving to himself or herself of reduced journey times – on routes already constructed (with taxes) – by paying the charge (not a tax), has not been easy.

In parallel, the implementation of truck tolling schemes in Europe has benefited from policy evolution not revolution: the replacement of a time-based road network access fee (vignette) with on-board electronic usage recording technology based on either DSRC or GPS – or some mix of these that permits a more refined charging structure to be applied. Finally, the introduction of Low Emission Zones (LEZ) can be used to target specific vehicle types (e.g. the London LEZ) or all vehicles (e.g. Italy and Germany) based on meeting emissions criteria or paying emission-related access charges, based on a single understandable policy: to reduce localised emissions.

So it is clear that we already have a combination of taxes, charges, tolls and other fees, each addressing some dimension of vehicle usage and applied to ensure high levels of compliance whilst being understandable to road >>>

## *“The entrenched nature of fuel taxation will be hard to shift but this has not stopped attempts at testing future policy options”*

users. This mix has enabled the provision and maintenance of the underlying infrastructure to be funded, the charge for some of the externalities imposed, enabled more consistent journey time and funded complementary measures such as public transport. So, as the revenue-generating ability of fuel tax becomes less bankable and become less reliable, could this mean that some of the institutional, technological, operational and business-level components that already make up road user charging, already provide us with an alternative?

### **IN DEFENCE OF PRECEDENCE**

The entrenched nature of fuel taxation will be hard to shift but this has not stopped attempts at testing future policy options. In general, the most controversial examples in Europe have focused on replacing vehicle ownership taxes with distance-based fees such as the (now aborted) Anders Betalen scheme in the Netherlands. In the US, the on-going pilots in Oregon (as an example of many other trials) are focused on identifying workable, publicly acceptable means of roads financing based on recording distance travelled in an auditable and cost-effective manner that address users' privacy concerns. As we have seen before in the development of new forms of RUC, these trials represent another good example of policy led, technology-enabled thinking.

The implementation of distance-based charges also allows for the redistribution of the burden and allocation of funds compared with current fuel taxation policy that is not location-specific. This would enable usage fees collected in specific areas to be allocated to the same areas if needed. Hypothecation may not always be appropriate but at least it would be more feasible with distance-based charging even without the additional technological refinements that could record a vehicle's location and



**Cross-border compatibility, and therefore interoperability, is a complex issue**

the time of day. Evidence shows that institutional and organisation hurdles may reflect the greatest challenge though.

The challenge faced by the pioneers of ETC and urban congestion charging schemes in isolated projects meant that the solution design and start-up investment could not benefit from precedence elsewhere; operational policies and regulations both need to be defined (and debugged) whilst the underlying systems were vertically integrated and self-contained. The development of early ETC schemes globally and most schemes today unfortunately, required each scheme to 'reinvent the wheel'. Even today, it is often with some reluctance that existing scheme operators would consider divesting their back office to a third party or providing CRM services to other smaller schemes, in part due to different levels of operational risk and lenders' requirements. The business case for outsourcing back offices

services could work but support for interoperability has been fragmented, unlike the global network of systems that support credit card transactions and cellular networks where charging is organisationally separated from billing.

The European Electronic Toll Service (EETS) defines separate roles, including charging and account management. Privacy concerns are addressed through the charging processes that collect and aggregate vehicle movement data being separated from the account management processes that only need summary information (eg, distance travelled) for billing purposes. The partial embodiment of EETS in Ireland in particular provides a good example of establishing a competitive playing field in ETC to drive efficiency through specialisation – an advantage that the collection of fuel tax has refined over the last 80 years. Furthermore, technology compatibility between regions helps drive business-level interoperability although the planned E-ZPass-Sunpass initiative on the East coast of the US involving more than 25 agencies in 15 other States highlights the organisational complexity of enabling inter-state interoperability and that in practice, technology compatibility (in this case different DSRC tags), may not always be necessary.

So what could this all mean? There is no doubt that fuel taxation is not location- or time-specific, unlike the application of tolls and charges. This means that fuel tax, in its current form cannot be used to target specific locations or time of day. Geographically, fuel tax is applied at the level of the state or nationally by government whilst tolls and charges are applied by local authorities or by the private sector through concessions. In addressing efficiency concerns, the cost of collecting usage-based charges could benefit from the clear separation of roles, specialisation and economies of scale (perhaps enabled through EETS-

## *“The economists may focus on the future of roads as a regulated utility, in the same way that other utilities such as water, gas and electricity are provided to consumers”*

type architectures), interoperability and cross-jurisdictional enforcement. Finally, since RUC has already been proven in the form of tolls and charges to meet local needs then a fuel tax replacement mechanism does not have to compete with this. So, focusing on the oft-quoted 3 dimensions of road user charging; Time Distance and Place (TDP), it appears that fuel tax replacement may be satisfied (and is more closely related to) distance-related measures leaving tolls and charges to satisfy local policy requirements; applied to individual routes to specified road networks.

### **IN DEFENCE OF TECHNOLOGY ENABLERS**

Usage recording solutions based on Global Navigation Satellite Systems (GNSS) are proven, at least in the inter-urban environment on heavy goods vehicles. The addition of the new Galileo and Beidou constellations will mean that a user's location will be defined more precisely as the density and dispersion of observable satellites increases. In addition, this will shorten the start-up time of in-vehicle receivers (to improve charging consistency) and improve positional accuracy in dense urban environments. For satellite technologies at least, their relevance to distance-based charging, for all vehicles in all environments, continues to improve; from RUC policies that target trucks on highways to the potential future of all vehicles in the dense urban landscapes. A comparison between the results of the technology trials conducted in Hong Kong in 1998 and Singapore in 2012 will show just how far we have come. Let's not forget that a simple odometer could also provide an auditable measure of distance measurement though, proven in New Zealand since 1978, although the

current round of trials in Oregon permit a user choice from a larger range of technologies, potentially enabling a range of value added services.

So, if we combine the needs with the technology enablers, it is suggested that a technology and operating platform that is developed for a fuel tax replacement mechanism is going to be straightforward to implement, will result in high levels of compliance, does not compete with existing localised schemes and is understandable to road users, ideally without requiring a large leap of political or public faith. In other words policy evolution rather than revolution may result in an easier pill to swallow. A more ambitious target, assuming the universal application of a fuel tax replacement mechanism would be define a solution that enables local tolling or charging schemes to be implemented at a lower cost, for example by providing data capture, billing and back office services that could be accessible to existing and new tolling and charging schemes.

### **IN DEFENCE OF THE FUTURE**

The economists may focus on the future of roads as a regulated utility, in the same way that other utilities such as water, gas and electricity are provided to consumers. Even the Internet, now regarded as a utility, is no longer an “all you can eat” service to reflect the large capital expenditure in communication networks that still have to be funded by all users. The universal access to the Internet implied by the net neutrality argument could largely apply to roads – perhaps as a “roads neutrality” policy, on the understanding that charges are dependent on distance travelled, potentially with some dependency relating to emissions.

While we may be confident in

predicting the demise of fuel tax in its current form and its potential replacement with distance-based taxation mechanisms, this process will have to face numerous political and public acceptability hurdles. It would seem that the technical, operational and organisational precedence of the many forms of RUC provides a useful starting point. In 2013 this debate will be further fuelled by international examples, including the outcome of the “tolls versus fuel tax” debate in South Africa, the transition to distance-based tolling in Taiwan, the results of the Oregon trials, the continued roll-out of truck tolling schemes in Europe, validation of GPS in the urban environment in Singapore and many more.

### **EPILOGUE**

The comments recently made by the International Bridge Tunnel and Turnpike Association (IBTTA), as part of its Moving America Forward campaign promoting “the role of user financing in supporting safe, reliable highway infrastructure”<sup>1</sup> shows that the past will probably be a good guide to the future regarding tolls at least. The broad category of road user charging has shown its applicability in many varied political, social and economic environments globally – and shows where we are most likely to find the most viable future for fuel taxation in each of these diverse environments. 📌

**fyi**

 Andrew Pickford is CEO of Transport Technology Consultants Ltd, based in Hong Kong

---

 [andrewpickford@ttc-global.com](mailto:andrewpickford@ttc-global.com)

---

 [www.ttc-global.com](http://www.ttc-global.com)

---

 For previous articles by this author, visit our ARCHIVES or enter PICKFORD in the search box on the home page of [thinkinghighways.com](http://thinkinghighways.com)

<sup>1</sup> Robert Horr, editorial *The Year of Moving Forward*, 9 January 2013 at <http://blog.ibtta.org/2013/01/09/the-year-of-moving-forward-2/> (valid on 14 January 2013)