

Transition Issues

Moderator: **ZHIRONG ZHAO**, *Humphrey Institute, University of Minnesota*

Panel: **JACK WELLS**, *U.S. Department of Transportation*

ADRIAN MOORE, *Reason Foundation, National Surface Transportation Infrastructure Financing Commission*

PAUL SORENSON, *RAND Corporation*

FERROL ROBINSON, *Humphrey Institute, University of Minnesota*

[Administrative Costs of Road User Charges](#)

Jack Wells: The study being discussed was sponsored by US DOT and conducted by HDR Decision Economics to investigate that administrative costs of moving to VM fees. Road user charges are perceived to have significant advantages over fuel taxes as a financing mechanism but high collection costs are perceived as a major weakness. This study is not definitive, but HDR is now part of a larger firm (HLB) which is experienced at developing toll systems and knows a lot about administrative costs. Getting administrative costs down to a reasonable level will be very important for VM fee system development and implementation.

There are several available technologies:

- Video tolling (LPR)
- Automatic Vehicle Identification (AVI) (I.e., transponder-based systems like E-Zpass)
- Global Positioning System (GPS)

There are also several road user charge scenarios:

- Corridor tolls
- Cordon tolls
- Nation (or area-wide) user charges

Some technologies are better suited for corridor or cordon tolling. Costs are dependent on what revenue is being generated. The figures presented in the study are weighted against what would be generated under the fuel tax and estimates should be regarded as an upper bound. This is because it is likely that many revenues would be much higher than what is presented due to the fact that pricing systems like cordon and corridor pricing would not be implemented if there was not a significant opportunity to generate revenue.

Corridor Tolls

For a 10 mile corridor, GPS applications are the cheapest running at about 4 to 5 percent of revenues. AVI is next at about 16-25% of revenues and video tolling is the most expensive at about 33-50 percent of revenues. Longer corridors will generally have access points that are fewer and farther between, thus requiring less infrastructure development in terms of gantries, etc. Costs are likely to vary depending on how often tolling points are established. For a 1,000 mile corridor GPS and AVI are tied running at about 2 to 3 percent of revenue. Video tolling is still the most expensive but now only runs at about 3 to 5 percent of revenue. With transponders there are numerous different technologies that can be used which causes more variability in cost. With GPS based units, you have the option to choose between thick and thin client computational systems; thin being the cheaper of the two.

Cordon Pricing

In this study the administrative costs of a cordon pricing system are not expressed as a percentage of revenue. AVI and GPS are tied in terms of cost, running at about \$2.1 million per year per 10 entry and/or exit points. Video tolling is more expensive running at about \$4 million per year. It is not known; however, how realistic these figures are due to the number of entry and exit points. Of course, it may not that matters as cordon tolling is not that popular here domestically.

Road User Charges

Fuel tax costs vary by state but are generally about 1 percent of revenues. In a national user-based charge system video and AVI would be generally be impractical. However, in a limited deployment administrative costs would run at about 26-51% of revenues if readers are used every 2 miles, 3-5% if used every 20 miles, and 1-2% of revenues if readers are used every 50 miles. The cost of GPS based systems will vary based on whether a thin or thick client configuration is used. Thick OBUs run about \$650 and are more complex to update on a regular basis but have fewer privacy concerns. Thin OBUs cost less, about \$195 per unit, but have more privacy concerns and higher data transmission costs. However, they are easier to update in terms of mapping software. Transaction costs are very low with GPS, running at about 0.07% of revenues. Capital costs would be about 1-4% of revenues. Total cost of the system, if including costs of OBUs, total costs would be 7.9% of revenues for a thin OBU configuration and 33.2% of revenues for a thick OBU.

Conclusions

GPS is only feasible technology for national user-charge system and administrative costs are feasible if a thin OBU configuration is used. However, these costs are still significantly higher than the fuel tax. Collection costs could only be justified if significant benefits other than just collecting revenue (such as congestion pricing, targeted emission fees, differential rates for roads of different load-bearing capacity, or better traffic data) are realized.

Issues

GPS has imperfect locational accuracy, especially in cities. There are also accuracy issues with closely parallel roads (such as interstates and service roads). However, GPS accuracy will improve as new GPS

signals become available. The OBU is key cost item and could be greatly reduced if built into the vehicle at the factory. Furthermore, thin OBUs are much cheaper but could raise more privacy concerns. The US DOT is representing civilian agencies in talks with the Air Force regarding the future of the GPS system. DOT is looking to address issues with urban canyons and other urban related GPS issues that impede the ability of GPS to function optimally in an urban environment.

Adrian Moore: I want to just briefly discuss a set of issues:

1. How much money is this system supposed to raise? – The point was raised as to why anyone would do this if you were not going to generate more revenue. This comes back to the issue of trust and what people are getting for their money. We have a general problem with getting people to invest in the system that overrides development of the system itself. How do we explain that transportation is currently underinvested in? We have to make the case that money is being spent effectively and get the focus off of the “Bridge to Nowhere.” We should perhaps focus on what could be happening with better investment. We are doing lots of pilots and every one of them seems to include a hefty public acceptance component.
2. Use of the money – Is it going to be a user fee or will it be a mileage-based tax that goes into a general bundle of spending? Doing this (allocating to general fund) would be stupid, myopic and absurd. The fuel tax is a second best user fee. Mileage-based user fees are a first best and it would be stupid to shift it to a tax. Spending the money ties into the public trust issue because people want to know what the money is going to be spent on.
3. How to set prices – This has not been discussed thus far. True price is based on supply and demand and the prices we would be discussing are at best an approximation of a true price. Any good price sends signals to the market in terms of demand. But what about the supply side? We don’t have pricing information feeding into our planning systems. Unless we “marry” these two, supply and demand, there will be a disconnect. Without a feedback into the supply side, price will just increase and roads will not develop in response to demand.
4. Incorporating Choice – Do we have “green” outcomes and do we provide other services? Another thing to think about is that choices within the system will allow for privacy issues to be addressed. If we design a system for everyone it will be expensive, but allowing for choice will allow people to adopt high privacy/high cost systems on their own. Not everyone desires the high privacy, and offering a choice will save us from having to implement the same expensive system for everyone.
5. Top/Down or Bottom/Up development – This issue needs to be addressed. What will be the role of the federal government in system development, and to what extent can (and should) that states be allowed to develop these systems on their own?

Transition Issues and Research Needs

Paul Sorenson: This research effort is twofold and is based on previous AASHTO and NCHRP studies into VMT fee systems and how they can be studied and implemented. What is emerging in this research effort is that there is a variety of perspectives that lead to a different view on how trials should proceed. There are also different views about who should lead, what transition strategies should be pursued, and the time frame for these activities.

In its initial study, RAND looked at nine implementation options, ranging from technically simple to technically sophisticated:

- Self-reported odometer readings
- Periodic odometer inspections
- Assumed annual mileage with optional odometer inspections
- AVI with fees based on fuel consumption, fuel economy
- OBU with OBD II port connection
- OBU with OBD II / cellular
- OBU with GPS (configured for coarse resolution)
- OBU with GPS (configured for high resolution)
- RFID tolling on partial road network

RAND also looked at ways of reducing system cost and speeding transition through the use of interoperable (or “open” systems) and the use of voluntary opt-in. With an “open systems” architecture, government publishes required specifications and firms would compete for market share based on price and value-added functionality. This will work to drive down cost and provide for continued innovation. With a voluntary opt-in period drivers choose to participate in the system so as to save money, gain greater convenience, and/or gain additional valued services. This strategy demonstrates that common concerns related to privacy, enforcement, and cost can be overcome

The coming authorization will provide a significant opportunity to fund a set of activities in preparation of a potential implementation beginning in 2015. As such, the study recommended targeted investment in:

- Planning
- Analytic studies
- Technical research and development
- Trials
- Public education and outreach

In this second study, researchers have focused on the types of trials that should be funded. Specifically, the study will look at

- What information decision makers will need in order to determine if it is appropriate and politically feasible to implement VMT fees;
- What information decision makers will need in order to determine the mechanisms and institutional arrangements for implementing VMT fees;
- What subset of relevant questions is best addressed through trials; and
- How trials can be designed to gain these necessary insights?

To date, the study has received answers to these questions that are “all over the map.” The different perspectives of our study participants have led to very different visions as to what future user fee trials should accomplish, such as:

- Help states help themselves – This does not preclude states working together or coordinating research efforts
- Learn enough to design a flexible federal system that states can opt into
- Jump start the market to develop and deploy in-vehicle travel services, including the capacity to support federal and state VMT fees along with many other applications

Moving forward, it may be a good idea to have larger pilots with participants numbering in the 10 to 100’s of thousands. If we are looking at possible implementation then those participants are going to become the future users of the system.

[Moving to a VMT-Fee System: Transition Considerations](#)

Ferrol Robinson: There are numerous attributes of a road charge system. A road user charge system must:

1. Accommodate all vehicles regardless of propulsion system;
2. Accommodate fuel tax collection until fuel taxes can be replaced by VMT fees;
3. Apply to all roads and jurisdictions;
4. Be capable of assessing higher charges to users who impose higher costs;
5. Have technology that accurately calculates distance driven (regardless of time, road and place of travel) and allows charges based on fuel efficiency, vehicle weight and emission level;
6. Ensure the privacy of road users, and be secure and reliable
7. Be flexible and accommodate future changes in technology and a variety of public policies
8. Generate a stable revenue stream that is able to grow as transportation needs grow
9. Ensure a ‘low’ rate of evasion
10. Ensure that collection costs are not burdensome to agencies or users

In transitioning to road user charges as a primary means of funding transportation programs, the following elements need to be considered:

- What vehicles and vehicle classes will be charged? (Electric vehicles may represent the “lowest hanging fruit” due to the fact that they are currently not paying anything.)

- What roads and jurisdictions will be priced?
- What will be the geographic coverage (urbanized areas, statewide, nationwide, etc...)?
- Will participation be voluntary or mandatory? Will incentives be offered if voluntary?
- What taxes and fees will be replaced/supplemented by the road user charge?
- How will the mileage charge rate be structured (flat, variable)?
- What is the basis for the rate structure (revenue neutrality, recover costs, etc..)
- What technology will be used? Will available in-vehicle technology be used or will after market devices be utilized?

The major implementation issues that will need to be address in the future include:

1. Policy decisions should drive technical approaches and solutions
2. A national policy framework needs to be in place to guide local-area implementation decisions
3. There is a need for large-scale implementations, not just demonstrations
4. Clear objectives (e.g., travel and congestion management versus revenue generation) will need to be articulated.
5. There is a need for extensive outreach and education with users, policymakers, and legislators
6. Decisions on revenue allocation will need to be made. Will it be divided among jurisdictions; will it go to roads where the fees are collected; will it be allocated to roads where demand is highest; what about transit improvements?
7. Role of exceptions and exemptions will need to be examined. They help achieve consensus but introduce equity problems.
8. We need a better understanding of the effect of pricing implementation decisions on different user-market groups.
9. What is the trade-off in terms of privacy and audit ability? It is essentially a customer choice?
10. The potential erosion of pricing revenues and benefits over time (VMT reduction, inflation, changes in road use) needs to be assessed.
11. What applications beyond VMT and congestion pricing can be incorporated? (Safety features, traveler information, PAYD insurance, parking)
12. How (and to what extent) will user fees systems interoperate with legacy systems?
13. There is a need to avoiding unnecessary complexity, as this erodes support for the system and drives up cost.

Audience Questions

With regards to the issue of revenue neutrality: in our focus group research we struggled as to whether this concept should be framed as a replacement to the fuel tax or a supplement or something else. I think that it needs to be framed in terms of local context. We had to go in and talk about it as a replacement so as to not get bogged down in discussions about TxDOT. In order to get good feedback on this concept we had to frame this in terms of not increasing revenue.

Jack Wells - This gets back to the issue of building trust in the transportation funding and financing system.

Adrian Moore – You have to find a way to present this.

Ferrol Robinson – One way to address this is to go through the focus group process and educate about the need for new revenue in the face of declining future revenues.

Jack Wells – It might also help to show that the GPS system allows for better collection and allocation of revenues based on where and when use is occurring.

How confident are you about the system costs identified in the FHWA study?

Jack Wells – The study is more of a snapshot in time. These costs will likely change moving forward

The \$650 identified as the cost for a thick client OBU is based on the 2006 German system. That cost is much lower now. The thin OBU has higher telecommunications costs. I also had a thought about the previous question related to framing in user fees as a replacement or supplement: When you explain things to people they get it, but this cannot be done on a large scale. What about doing some sort of federally sponsored spots that address the current funding situation?

Jack Wells – Virtually all fed agencies are prevented from lobbying, and it sounds like this is what that type of effort would be.

Adrian Moore – And part of the problem is getting things like that on television. There is a substantial cost associated with running spots like that and is not very cost effective.