





PROGRESSING VMT CHARGING IN THE UNITED STATES

I was a panelist at the IBTTA Legislative Conference in March 2011. Panel moderator, Marcelle Jones from Jacobs Engineering, asked her panelists to view the Progress of VMT Charging in the United States through the lens of a popular management model used at the IBTTA that looks at five critical elements: Vision, Skills, Incentives, Resources and an Action Plan.

Vehicle Miles of Travel (VMT) Charging is controversial, even among its advocates. Some see it as inevitable and others see it as impossible.

What is *inevitable* is that something's got to give as the current funding sustainability crisis inches toward disaster. Our front-end-loaded fixed tax regimes not only help keep congestion growing by hiding price signals, but the taxes based on fossil fuel are at the mercy of energy efficiency and the eventual waning of oil. The fuel tax will dry up of its own accord. We are left with registration taxes, sales taxes, property taxes, and the general fund — all of which create the recipe for the tragedy of the commons and more congestion.

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Green shifting is the enemy of the fuel tax. Self-generation of power for electric vehicles will make it difficult to tax electricity, as the more

fortunate will invest in “net zero homes” and charge their vehicles at zero marginal cost. If we keep waiting, the solution we end up with will be poorly planned, inelegant, and less acceptable than the one that is possible now, with a bit of thoughtful planning. Not solving this problem the right way will make it worse for everyone, especially the less fortunate who have fewer options to invest in solutions.

What is *impossible* is putting a dedicated device that costs \$15/month into every vehicle and using it to collect fees that may vary between \$10 and \$60 per vehicle-month. Until now, many think about road-use charging or VMT charging as a dedicated and enforced measure-and-collect system. Even

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if in-car instrumentation costs plummet (and they will likely bottom-out at \$100/vehicle year in 2010 dollars), the fact of a fee collection device on a dashboard that provides no tangible reward for the driver will never garner acceptance. Hence, some of us talk about adding some useful features to such a system. Most features proposed so far are already available and will remain available through other means, weakening their appeal for this context. The features that would tip this balance need to be very compelling and very rewarding, providing personal economic rewards far in excess of the personal costs. They need to be much more than navigation features and congestion indicators. They need to be so compelling that driving without them would be as horrifying as losing your smart phone on the bus. According to recent studies reported by Jens Schade, they need to be perceived as 2.5 times more rewarding than the perceived ‘loss’ of acquiring such a device and paying road use this way.

VISION: HOW CAN WE REACH CONSENSUS?

In some aspects our vision is very clear. We enjoy consensus among transport economists and some social thought

leaders that the fuel tax needs to be replaced, and that with a bit of thought, congestion, funding, emissions and modal balance can be addressed simultaneously as we rethink how we pay for automobility. Until recently, our vision has been somewhat inspired by the Dutch effort to define an alternative to their existing automotive tax regime, but the failure of their road-pricing scheme due to a parliamentary collapse has left the world with a VMT Charging leadership gap. But this is only one part of a necessary vision and to date too few journalists, politicians, and drivers share this fledgling vision. Where we all agree is that we are managing surface transportation badly, but that is not much of a vision.

Worse, in many other aspects we do not yet share a vision or even a consensus about the problem. How should we address the social equity aspects of the change? How do we provide alternatives? (Witness our high-speed rail debate.) Should drivers pay all externalities? Should other road-use beneficiaries, such as employers, merchants, and sports stadiums that rely on and profit from the users of those roads contribute to the funding of those roads? How will land use change? Do property tax structures need to change

as well since mobility and land use are so tightly interconnected? Few of these issues have been studied in their full context; none have a consensus response. There are a lot of ways to tax for revenue and a lot of ways to tax for behaviour but there are fewer ways to strike a good balance between the two. Pure distance charging is biased to the revenue side and has many downsides. Equally true, a theoretically “perfect”, multi-variant charging regime would be complicated and many would not be able to respond correctly to it due to an inability to understand, or care about, its demand signals. I doubt we have asked all the questions we should ask.

We focus considerable debate and effort on a government-invented and government-operated collection system, on the benefits of a reliable revenue stream, or on the reduction of congestion. But we concern ourselves too little about the effects of what is to be collected. We know people will adjust how they drive, where they live, what vehicle they will buy and what modalities they will prefer. We assume drivers will vote people in or out of office on the basis of their position on VMT charging. But, we do not share an understanding of the effect on land prices, on employment patterns and



on welfare. We have not even reached a comfortable consensus on sprawl, and where that will trend. I assert that we cannot predict all of these things with certainty and that by proposing a sweeping, mandated change we may be inviting unintended consequences that we can hardly predict. This leaves our vision incomplete.

We understand there will be resistance to a mandated shift to pay-for-use, but since we are “certain” it is the right path forward, we appear to assume we can debate, educate, cajole, guilt, or legislate our way through it. The Dutch were not prepared for their project to be precipitously halted. Neither are we. There is a way to ensure that cannot

happen to us, but only if we take the deployment initiative off the political to-do list.

At the moment, our vision is monolithic, cloudy and hobbled. I suggest we look for a voluntary approach to this change — one that relies on a rapid and evolutionary set of steps that allows us to observe how the changes and their effects unfold in ways that offer choice, permit thoughtful adjustment, and protect the value of the core vision of reduced congestion, stable funding, a move to cleaner vehicles, and changes in modal balance. Fortunately, there are now many groups of people working on ideas that enable such an evolutionary change. These

ideas, which I group roughly under the still ruminating technology heading of “connected vehicle” need to coalesce and be guided and encouraged, rather than mandated. Road-use fees can piggyback on these innovative systems at far less cost and with balancing benefits greater than 2.5 times the perceived pain of usage fees. But most of all we need to share an understanding of the psychology and sociology of automobility — which we, so far, relegate to dry and inaccessible academic studies to our detriment.

What voluntary, government-regulated, and industry-developed programs do is allow us to ease into this tax shift as a progressive program, picking paths of low resistance and high value. Incremental success erodes fear, and turns neutrality to support. We can reward early adopters, and address stragglers with adjustments to the tax systems already in place. Guided by an

interpretable menu of tax and fee structures, most people will make reasonable choices as we proceed. The one thing we can absolutely rely on is that most humans make decisions that they think maximize their personal, close-range welfare.

SKILLS: IS THE TECHNOLOGY READY?

The technology *is* here. Oregon, one of several heroes in this road-use pricing business, was a pioneer, and Oregon’s results have been replicated and improved several times around the globe, including Germany and Slovakia in the European Union (EU) and Minnesota and Iowa in the United States. Road-use-metering technology has come a long way in the past six or seven years, far surpassing the Oregon trial’s vintage technology. Who today would fly the Atlantic in Amelia Earhart’s Lockheed Model 10 Electra?

WHAT VOLUNTARY, GOVERNMENT-REGULATED, AND INDUSTRY-DEVELOPED PROGRAMS DO IS ALLOW US TO EASE INTO THIS TAX SHIFT AS A PROGRESSIVE PROGRAM, PICKING PATHS OF LOW RESISTANCE AND HIGH VALUE. INCREMENTAL SUCCESS ERODES FEAR, AND TURNS NEUTRALITY TO SUPPORT.

The Oregon trial was important to our understanding of drivers' willingness to change choice behavior, and to even consider the shift. Oregon also explored an "at the pump" charge collection model. This is important because it forces us to think about how we handle electric vehicles (EVs)-which the Oregon Department of Transportation (ODOT) is exploring again in 2012. We need to especially consider those that recharge in their garage or driveway. It forces us to ask how we can collect usage-fees reliably, incrementally, and fairly, all while preserving privacy with minimal, non-intrusive enforcement.

Perhaps the Skill question needs to be monetized. How can we remove or at least reduce the expense, and who will pay for it? Three or four years ago, Ed Regan (Wilbur Smith) calculated that it would cost about \$50 billion for an initial instrumentation of the 250 million vehicles in the United States. That number, while perhaps not much exaggerated at this writing, will soon be \$25 billion. Furthermore, Ed's number was a one-time capital expenditure (CAPex) and my \$25 billion is an amortized CAPex plus the ongoing Opex; that bill comes due annually. So while device costs are tumbling, \$600 in 2005 (Germany), \$250 in 2010 (Slovakia),

\$200 (today), and will bottom-out toward \$50 in five-to-eight years, operational costs will always remain. I cannot see *dedicated*, telematics-based VMT Charging instrumentation costing less than \$80-\$100 per vehicle-year in 2010 dollars. Even quarterly odometer-readings — with little demand effect — would be this expensive. Dedicated VMT Charging instrumentation will never make good *business sense*. It has to piggyback on a far larger vision, and the *Connected Vehicle* is the current candidate vision. And that is what "industry framework" means in the study "*System Trials to Demonstrate Mileage-Based Road Use Charges*" that Paul Sorensen and Liisa Ecola of RAND completed 18 months ago for the National Cooperative Highway Research Program (NCHRP).

To equate skills to technology is to make a fundamental error, because we need so much more. The skill we need most is making a tax shift *acceptable*, and that has less to do with any particular technology element (although a cluster of innovations will be invaluable), and more to do with automobility. This is a social problem and social problems demand political skills. We look too little at transport demand management, and not often enough

at congestion as a social problem. We have far too few political skills currently targeted at this.

Solving the privacy problem is also a skills issue. Weak privacy assurance is a deal killer. Privacy protection is easily solved, but not easily believed, trusted, or even understood; therefore, this will require considerable skill. Privacy does seem to have some generational bias, but I suspect that the gender bias may be even stronger. Even with a very strong generational bias, which I highly doubt, it would take far too long to die our way out of the problem. Privacy is solved (technically), but the solution is not understood, and that understanding cannot be mandated. But the fear and misunderstanding can be eroded through voluntary programming.

The mantra that VMT Charging is “another tax” (as opposed to a tax shift) is also currently a deal-killer. This too needs skill and voluntary programming. Raising the fuel tax and then offering a rebate to those who switch to VMT Charging is one possibility, but a pure raise just puts off the inevitable failure of the fuel tax. In fact, it worsens the funding problem as drivers abandon fossil fuels.

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INCENTIVES: WHAT’S IN IT FOR ME?

I look at incentives selfishly. “What’s in it for me?” Even, “saving the world for my grandchildren”, holds a selfish element. Incentives mean that if I switch to VMT Charging, I will get a ton of personal value. Unfortunately, better transit and a nicer world for my grandchildren are not getting my attention so far. I need to save money if I opt for another choice. Parking convenience and traveler services could make a huge difference to me. I want eco-rewards if I drive greener, and I want to spend less on insurance premiums if I drive less. I want tangible safety improvements and yet more reductions in insurance premiums to match. And if



you throw in a fuel tax rebate, then I might finally listen. And the best way to do all of this is with telematics services that cost \$100 a year and delivers \$250 in *net* benefits to me every year, which is the 1:2.5 ratio that transportation psychologists like Schade are telling us we need. Give me that, and I will tell all my friends. Industrial marketers know how to solve this through social networks and incremental services. Governments don't always operate well in this domain. Let industry in to help.

We cannot get to VMT Charging without acceptance of the shift and its technologies. We can't get to acceptance without incentives. Fortunately, many potential and closely related

incentives carry with them a demand-management bonus. The trick will be to get at them, and that will take Skill.

RESOURCES: FEDERAL? OR STATE? OR?

Federal funding should go to cities willing to shift away from free-parking and toward parking using telematics-based VMT Charging technology — to insurance companies willing to shift customers to usage-based insurance on the same telematics technology, and to states or cities willing to offer eco-rewards, perhaps in the form of gas-tax rebates or parking discounts — again, using the same telematics meters for time, place and use determination. Some of us look to interoperability

from the existing toll industry. This would be nice, but it is an interim measure, since the existing technology (RFID/DSRC) has only limited VMT Charging capability; though it is suitable to limited access highways, it cannot toll everywhere. DSRC does a good job on road segments, but will not let you lift the fuel tax for VMT participants. DSRC is less private and far more expensive than GPS when applied over regional or statewide geographies. I also doubt the existing players want interoperability — if they wanted to, they would have started this long ago.

Federal funding should not incentivize telematics providers. Rather, it should build demand for payment and safety services. If they created demand, there would be a feeding frenzy from industry. The federal government would be smart to auction three or four road-use-metering licenses to major telco or bank consortia, in order to raise five or ten billion dollars for funding market development while

guaranteeing ten years of market protection to the auction winners accompanied by guarantees to collect piggybacked VMT Charges.

A VMT ACTION PLAN: WHAT SHOULD WE DO?

I don't think we have a workable plan, yet. The NSTIF Commission (2007–08) set out early steps. It called for significant, funded trials in the next re-authorization that was to have been executed in 2009. They also assumed these trials would likely set our path to VMT Charging for the subsequent re-authorization, so that the shift would be well underway by 2020 and perhaps could not be turned back by then.

The October 2010 NCHRP-RAND report compared three leadership approaches: Federal, State, and Industry. I favor industry, because industry can provide the technical and marketing skills, and the social innovations that VMT Charging desperately needs. Why? Industry fixates on acceptance, choice, flexibility, profit, desire, incentives and rapid, competitive innovation. Industry

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is better able to adapt as technology evolves, and is in a position to offer profit-generating business models that will help cover the cost of VMT-style, smart-metering innovation and operation — something governments cannot do. Such a focus would find surprising and acceptable solutions far sooner than would a government searching for a way to corral drivers to accept mandated metering.

New York City's Bruce Schaller, Deputy Commissioner for Traffic and Planning, illustrated this industry approach in 2011 with his groundbreaking *"NYCDOT DriveSmart Technology RFEI: Safety, money-saving and time-saving technology for drivers."* Mr. Schaller solicited private vendors interested in equipping vehicles for several applications simultaneously: usage-based insurance, fuel efficiency and route advisories, crowd-sourcing and social media programming (targeted, of course, at

younger drivers), High Occupancy Toll (HOT) lanes and parking payments, and eventually usage-based road-use fees should that time come. He was unconcerned about the specifics of the technology, and more concerned that it would achieve his goals and be acceptable to drivers. He also implied that such vendors propose a way to self-fund such systems, which one hopes can be done on a recurring revenue basis to industry rather than based on a large capital outlay from taxpayers. This is precisely the "industry-led" option described in the Sorensen-Ecola 2010 study.

If the federal government had authorized the \$300 million that was proposed for the Surface Transportation Revenue Alternatives Office in the FHWA Budget Estimates for 2012, and this money were directed to building the demand for telematics payment services, the above problems of

Vision, Skills, Incentives, and Resources would disappear, and an Action Plan would emerge. If we focused on building demand for a telematics payment services market leveraged by several billion dollars of industry investment in operating licenses, and cease our throwaway technology trials, we would spend our limited resources more wisely and find solutions we had never imagined. America has hardly begun to unleash its famous ingenuity.

CONCLUSION: WHEN WILL THIS CHANGE COME?

Every American has an answer to this that ranges from “now” to “never”. My answer? It can start now, but only if we ease into it with incentives and

voluntary programs. We do not need technology trials; we need industry trials, schema trials, incentive trials, service trials, and acceptance trials. We need to allow industry to figure out the collection technology and what will make drivers flock to the new way of paying for mobility, while government legislates privacy, fairness, equity, access, and other social matters. And these trials need to be designed to morph into permanent programs that generate desirable solutions for drivers and markets for industry. The technology is ready for this, what we need to work toward are statewide and national voluntary programs that are designed to evolve into support for a future VMT-Charging mandate.

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