

2009 Symposium on Mileage-Based User Fees

Symposium Proceedings

April 14-15, 2009

Austin, Texas



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SYMPOSIUM ON MILEAGE-BASED USER FEES

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April 14-15, 2009
Sheraton Austin Hotel
701 East 11th Street
Austin, Texas

Conference Proceedings

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The preparation of these proceedings was funded by the University Transportation Center for Mobility™, Texas Transportation Institute, Texas A&M University System.

2009 Symposium on Mileage-Based User Fees

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Welcome, Opening Remarks and Overview of Symposium

Tuesday, April 14, 2009

GINGER GOODIN

Senior Research Engineer, Texas Transportation Institute

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I want to welcome you all to the symposium and to Austin, Texas. We are very excited about the enthusiastic turnout for this event, particularly given the state of the economy and travel budgets. We have around 70 participants; that is what we were hoping for. We have about 20 different states represented, 3 different countries, and about 45 to 50 different organizations. So we are thrilled with the turnout and the diverse background of all of you who are here in the room.

The topic at hand is one of interest to agencies, organizations and different people across the country and internationally. I hope that you will find the next day and a half a valuable use of your time in learning, sharing information and ideas, connecting with other interested individuals and contributing to the conversation.

I wanted to give you a little bit of background on where this all started, that is, the idea of holding this symposium. A number of us were in Minneapolis last September for a Transportation Research Board conference that was not on the topic of mileage-based fees; it wasn't even about transportation finance. It seemed like every time I ran into Ken Buckeye from Minnesota Department of Transportation (DOT), we weren't talking about the topic we were there for, we were talking about mileage-based fees. They had research going on in Minnesota; we had research going on in Texas. And Ken was an advisor for our research project. I remember Ken saying, "What we really need is a path forward," so we started with this idea of bringing together experts and diverse groups of individuals to help potentially define what that path forward would look like.

Little did we know that Lee Munnich and Katie Turnbull were having a parallel conversation, which then formed the basis of our group, along with Trey Baker from Texas Transportation Institute (TTI). And then I met Jim Whitty from Oregon, as he came to Texas last fall to speak. I talked to him about the idea of the symposium, and he was enthusiastic about joining our group and helping out.

I wanted to personally thank all of you, all of the planning committee, for the hard work you had put into this. I am grateful for the chance to work with you on it.

So here we are. I am not going to go into a lot of the detail about mileage-based fees because we have so many fantastic speakers that are much more capable than I am in presenting it. But what I want to do is give a brief overview to kind of set the stage, share with you the reasons that this is being looked at, provide some of the initial reactions, discuss the challenges, and show you the vision and structure of the symposium. This is not a typical conference; you will play an important role in the outcome. So you will have to listen carefully in a few minutes when I give you your instructions.

Why mileage-based fees? I think everybody recognizes that the fuel tax revenue over the long term is not sustainable, and that is the conclusion of a variety of panels who have studied this. We do not have the ability to make sure that revenue growth keeps pace with population and economic growth because of the influence of increasing vehicle fuel efficiency. I am going to quote Ken Buckeye again, when he says, “We are charging for the wrong consumption—we are charging for consumption of fuel rather than consumption of the transportation system.” So what a mileage-based fee would do is to separate fuel use from highway use and remove the conflict with energy and environmental policies that we have nationally. Those policies are promoting a reduction in total fuel consumption so as to reduce our reliance on foreign oil and improve the environment, yet our transportation funding is based on consistent consumption of fuel.

There is also the possibility for mileage-based fees to achieve some other objectives. They present an opportunity for congestion management through pricing by shifting trips from peak to off-peak, potentially reducing the total number of trips or shifting trips to other ride-sharing modes or telecommuting. It is really about more efficient use of our existing facilities through pricing.

Mileage rates can be set up to potentially provide incentives for higher vehicular fuel efficiency, or they could facilitate a carbon emission charge.

Such fees may also provide the opportunity to charge for the direct impact on our physical infrastructure, as they directly represent the actual amount of travel, which is a key factor affecting the cost of supplying, operating, and maintaining the highway system. It has a potential to transform the way we allocate resources based on use.

There are a number of different panels and groups that have talked about mileage-based fees, and they have suggested further research and exploration. A Transportation Research Board study back in 2006 stated, and I quote, that “this appears to be the most promising technique for directly assessing road users for the cost of individual trips within a comprehensive fee system and to generate revenue to cover the cost of highway programs.”

The National Surface Transportation Policy and Revenue Study Commission produced a report in 2007 which stated that “the mileage tax should be strongly considered as a long term replacement for the fuel tax.” And more recently the National Surface Transportation Financing Commission noted that with the effective shift to more fuel-

efficient vehicles, it is increasingly difficult to rely on the gas tax to raise funds for needed improvements.

This is something that has been discussed in the last several years, and reaction to it has been, I would say, largely negative. All of this media coverage has been happening in the recent last few months. Some has been a reaction to the National Infrastructure Financing Commission and its report, some has been related to various state studies that are going on, and some has been related to Transportation Secretary Ray LaHood's comment on mileage-based fees and the aftermath of this comment.

This is generating a great deal of interest.

Now a little bit about the challenges, and a lot of them are associated with the negative reaction we are seeing. Public and political resistance is probably one of the greatest challenges, and it is not just resistance to change but is specific criticisms we will continue to hear from the public about this idea.

First is privacy, which is the most critical concern. It is generally expressed as concerns about how data is collected, what data is collected, how that data leaves the vehicle, how it is transported and who gets the information.

A second issue is that the current system provides an incentive to drive more fuel-efficient vehicles, and on the surface, the mileage-based system would not.

The cost of administering a mileage-based fee is one of the biggest issues we encountered in our research here in Texas. The fuel tax is very inexpensive to collect, so many wonder why not just raise the gas tax or index it to fuel efficiency instead of creating a whole new administration and bureaucracy to make the new system work?

And then there are a number of concerns associated with the perception of fairness and equity. In our research one of the most common comments was that these fees would penalize rural drivers because they tend to make longer trips and would be unfairly penalized with a mileage fee.

There are issues associated to the transition from the current system. What if the technology and the institutional framework will not be cost effective and address public concerns? What rate structure and policies should be used, and how will funds be distributed?

There are also questions about how such a system would be rolled out. Would it be piecemeal or coordinated? Would there be a national roll out, or would it be a state-by-state approach? Would there be open standards? What is the role of the private sector?

So given all of these questions and challenges, the symposium planning committee envisions this event as a chance to advance the discussion. What we hope to do during this time and during the next day and a half is to have an open discussion about what

mileage-based fees are, what they are not, and how the concept can potentially be moved forward given the diversity of perspectives.

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U.S. Pilot Projects

Tuesday, April 14, 2009

OREGON ROAD USER FEE PILOT PROJECT

PUGET SOUND REGIONAL COUNCIL TRAFFIC CHOICES STUDY

UNIVERSITY OF IOWA NATIONAL ROAD USER CHARGE STUDY

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Jim Whitty

*Manager, Office of Innovative Partnerships,
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My presentations tend to be a mini-symposium covering every topic I can think of. This whole vehicle miles traveled (VMT) charging thing began, as I mentioned, with Professor Dave Forkenbrock and then the University of Iowa research. Oregon was one of the fifteen states in the consortium. Then all of a sudden during the 2001 Oregon legislature, a couple of legislators decided that maybe the state should begin to move away from the gas tax. Early during the session, they held an informational hearing where they heard about all these new vehicles coming along; the hybrid electric vehicle was new back then. They looked at natural gas vehicles and at hydrogen fuel cell vehicles. One of them started worrying, “What happens if people start buying these vehicles?” Well, now the public is starting to buy them, but back then nobody thought they would, but they thought maybe we should prepare for that day. These legislators sponsored a bill that went completely off the radar; nobody saw it coming, and it passed into law. The legislation created the Road User Fee Task Force, and the legislators actually put it together quite well. They created a 12-member task force that was appointed by the governor, the Senate president and the speaker of the House. The best decision was to put four members of the legislature on the task force, one from each caucus, a Republican and Democrat from the House and also from the Senate. That became very helpful later on when the whole topic became controversial. To have somebody from each caucus who knew what was going on was very helpful.

The task force was given a mandate to develop a new road funding system to replace the old. In Oregon, that means replacing the gas tax. The state is highly dependent upon the gas tax for our road revenues. Gas tax revenues have recently dropped in Oregon, though not so seriously as at the federal level where there was a three percent drop. Oregon has experienced a drop of a half percent this last year and a half percent the year before that. But if you look at what is happening with the differential between what the state expected the gas tax to cover with inflation and what the state actually got, the difference is more like four or five percent.

The task force examined 28 different revenue mechanisms, and they came up with just a few to make up the new system. The principal new revenue source was the mileage charge because a broad base charge would be needed to replace the broad base of the gas tax system.

They also chose congestion pricing as one of the alternatives, so we tested it as well in our pilot project. The challenge for the mileage charge is this: what kind of a system and how do you collect it? Oregon Department of Transportation (ODOT) had the obligation under statute to do a pilot project based on the recommendation of the task force. But ODOT needed to determine what we wanted to test. I decided that I wanted to develop and test an actual system that could function and be successful if fully implemented. So that meant ODOT needed to think through all of the processes that would be required to collect the charge.

So you develop a concept first and then you test it. But when developing a concept you have to think that you are replacing the gas tax. Now, you could use the mileage charge also to augment the gas tax, and that is an interesting discussion, but in Oregon, the project was to replace the gas tax. That was the purpose. You look at the gas tax, and to replace it becomes a daunting challenge because the gas tax operates so well.

The gas tax is failing right now, but for 90 years it was great. In fact, Oregon was the first state to implement the gas tax back in 1919. The gas tax covers every motorist and is easy to pay in that it is paid by the distributor, who is then reimbursed by the retailer and then the motorist. The gas tax raises a lot of revenue and is very inexpensive to operate. In Oregon, it costs around \$1 million a year operationally to get \$400 million in revenue. Think about that. The gas tax has about a quarter of a percent operational cost. Of course, it is already in place, so it doesn't require any new capital expenditures.

The gas tax has no privacy invasion whatsoever. You don't have to report where you go to the pump. Now people use credit these days, so there is the possibility for invasion of privacy for court actions or things like that, but basically there is no government mandate for using credit. There are only a few payers—I think in Oregon there are 157 distributors who pay—and nationally there are 10 or 12 times that, so there are not that many. With very few payers nationally, the gas tax is very simple to manage. There is also only a small burden on the private sector.

But of course the gas tax is failing because of the market. The gas tax is failing because it is no longer directly connected to road use, even though years ago it was connected to road use. We have different kinds of vehicles on the road now. Gas tax revenues are eroding because of fuel efficiency improvements, and that has been like a hammer to the gas tax. This is the motivating factor to find something new.

The task force decided to give us two directives that were easy to follow: cover all motorists and do not charge out-of-state mileage. At the time it was an issue whether we would charge all mileage or just state mileage. The task force also wanted protection for motorist privacy. They wanted a gas tax credit for those who would normally pay at the

pump the gas tax and the mileage charge. They wanted a low capital cost; they didn't want it to be expensive to employ. They wanted a low relative operations cost like the gas tax. The new system had to be enforceable. They didn't want any lost revenue; everybody pays the gas tax—everybody—so they didn't want any loss under the new system. And the system must be reliable. They decided it would be best if the mileage charge was collected electronically. They also wanted a seamless transition; they didn't want to lose revenue switching from the old system to the new one. They wanted a minimum burden on the private sector, which was primarily a Republican-driven idea, although Democrats supported it as well. Then they added congestion pricing. Sounds simple, but it wasn't that simple. It took over a year and a half to design the new system to meet these criteria.

Fundamentally, we needed to create zones. We looked at it a number of different ways, such as putting switches at borders and things like that. I think some of those ideas were still on the table for exploration. We basically settled on access to the global positioning system (GPS), and that seems the more viable and inexpensive way to identify zones, rather than putting gantries all over the place. But we took the gantry system pretty seriously. We ended up, after starting with what I call "central billing" as the fundamental way to collect the charge, with collection at the fuel pump. This seemed to solve most of the problems and met most of the directives of the task force. Central billing has difficulty with giving a gas tax credit, at least we thought at that time. It is very easy to get a gas tax credit at the pump.

We also tallied the cost of collection of the central billing model and realized that because mailing costs and enforcement costs are high and add up quite quickly, central billing would be fairly expensive. However, I think there are ways to reduce that cost because you can have people pay either by automatic payment, like they do at toll roads, or maybe e-mail based billing and Internet payment, which would not require mail. There would be a significant number of people that would actually require a bill to be mailed to their home, and of those people a large percentage will not pay that bill. You will, therefore, need to have enforcement actions. That adds to the cost. However, at the pump, if you don't pay, you don't get your gasoline (or whatever the fuel).

We are going to start to see more electrical vehicles very soon, perhaps in 2010. But in 2003, the electrical vehicle was declared dead. It wasn't an option at the time, so payment at the pump seemed the way to go. There are a lot of advantages and also a lot of disadvantages for systems that do not cover electrical vehicles. That is a problem that the gas tax collection system has that needs to be resolved.

Basically, there is a receiver of the satellite signals from the global positioning system in the car. The device identifies zones by latitude and longitude and counts miles within the zones. That data is read by a mileage reader wirelessly at the pump. The mileage totals within each zone go to the point of sales system at the fueling station, which is then shared with the central computer. The data transferred includes the vehicle identification number, the mileage totals for each zone and the fuel purchase amount. This allows a minimal ability to audit and to identify anomalies in the system. One privacy issue that most people have picked up on is that the department would know the make, model and

year of every vehicle on the road and who owns the vehicle. But with that information we can look for anomalies in the system and determine who might be tampering with the vehicle and the device. Then, the mileage fee rates are applied to the mileage data, which goes back to the point of sale system where the motorist is presented with the billing and pays the charge.

One of the central features of the Oregon model was to make it really simple and easy for motorists to comply with the system. There are other models. I know people from Minnesota have been looking at something that doesn't require a mileage charge payment at the fuel pump; they are looking at a way to minimize the capital cost of collection. There are ways to do that, but when you do that you have to increase the burden on the motorists. It is almost like if you push up one, you push down the other. It is a different focus. It is a legitimate focus to have, let's say, less capital cost for a collection system at the pump and greater responsibility for the motorists. That is legitimate. Our view is also legitimate: to minimize the burden on motorists by increasing the use of electronics at the pump. Both are legitimate and open to discussion. Our view of minimizing the burden on the motorists involves thinking about public acceptance. We will see how that goes, but the public didn't seem to like our model anyway. There are reasons for that, but I don't think it was the actual model. It is more the idea of mileage charging that they opposed.

We actually tested non-equipped cars in our pilot program. They were identified as non-mileage fee payers at the pump, and they paid the gas tax. Heavy trucks were not part of our test or of our model. There are ideas about how to charge heavy trucks a distance- and weight-based charge. In fact, Oregon already does it but under the paper-and-pencil method. A weight-distance tax is the fundamental way that trucks pay their road obligation in Oregon. But to make it efficient, it might have to be electronic. This is a little bit more difficult because you not only deal with distance but also with declared weight and number of axles as well as configuration.

The cost of the system, we thought, was affordable. There was no mandate on retrofitting components on new vehicles prior to sale, which was an alternative at the time. Now people are exploring plug-in possibilities, and I think that is worth the exploration. The devices are getting inexpensive. The service stations' capital costs were figured out back in 2003 and was \$35 million for a one-time capital cost. That cost might come down with time because we are basically talking about computers and mileage-reading equipment, so the capital costs may become less than that. The annual operating costs would be about \$2 million a year, a bit over the gas tax but still quite efficient.

Privacy—there are more recent approaches to privacy. We basically eliminated the creation of certain kinds of data. We made sure that only the mileage totals, not the travel specifics, were transferred by short-range radio frequency. There was no travel history retained in the vehicle. But a lot of people think that the signal is coming down and is picked up by the on-vehicle device and that the on-vehicle device sends a signal back up to the satellite. This is a very common misunderstanding, as not even the military system works that way. It simply is not part of GPS whatsoever. Navigation units do have a signal going out from the device that the provider uses to enable contact with the device

and motorists, but that is something people contract for. We eliminated the signal for anybody else to pick up and follow. The device can track itself, but no one can track the device. This is largely misunderstood by the public.

In a navigation unit you have a geographical information system (GIS) digital map; we eliminated that. All that is in the device are coordinates identifying the borders of the zones. In the state of Oregon, these coordinates outline the state of Oregon, and this is where the device starts tracking miles. Miles can be counted either by the GPS receiving device or by the odometer. We captured it both ways in our system, primarily with the odometer, but not every car would work that way, so we had some working with the GPS receiver.

A navigation unit develops a travel history. We simply eliminated that. The only data in the device were mileage totals by zone. There was a “no signal” zone, basically for driving underground or in parking garages. This is all we ever learned about travel history.

Oregon’s pilot program started three years ago. The objectives were to prove the concept of a per-mile base charge, as well as to test congestion pricing, but also to define a development pathway using prototype equipment that had never been put together. We wanted to find what the problems were and also to identify technology issues for further refinement.

(Referring to presentation)

This is the technology pathway on the right. It looks complex, but it was just as fast as a credit card transaction. We used a congestion pricing strategy called “area pricing.” Since we were not using a GIS map, we simply identified the borders of each zone, for motorists entering that zone, both geographically as well as temporarily. Miles driven within that zone are identified as rush-hour miles, with a different rate. The rush-hour zone was from 7:00 to 9:00 in the morning and 4:00 to 6:00 in the evening during workdays.

We had 285 passenger vehicles involved and 299 actual drivers involved. There was a control phase where we determined what your travel history was and then the experiment phase was in the second half. There were three zones and three motorist groups, a control group who paid the gas tax, a mileage-charge-only group who paid 1.2 cents per mile, and a rush-hour group. (By the way, 1.2 cents per mile was equivalent to the gas tax rate in Oregon, as at that time the average motor vehicle got 20 miles per gallon.) The rush-hour group paid 10 cents per mile for driving during peak periods. We dropped the basic charge to 0.43 cents per mile because we promised the legislature we were not going to raise any additional money from the pilot project.

The devices were very simple: the GPS receiver antenna, the white box which is the mileage counter, and the antenna on the top was the antenna that transferred the data to the fuel pump through the white box on the bottom. We had a screen on the upper right, which was important for motorists to know when and where they were driving and what

zones they were in. That proved to be an important decision, although it did tend to add power consumption. That was challenging for vehicles with a weak battery, and we lost a few batteries along the way.

The results were positive. Zone differentiation and mileage counting worked perfectly as well as transmission accuracy and administration. We had a little trouble with the vehicle identification at the fuel pump. We had Car Toys install the equipment wherever they thought it would work. They had to go from large vans down to sports cars, and the antenna was not located properly on all of those. There was a very quick turnaround on the technology development from a local manufacturer.

The grant term limits proved very problematic for this pilot project. We had three years to do everything. That means you have to cut off...guess what? Quality assurance. This was a problem for vehicle identification at the fuel pump. But we now know how to solve this problem.

Peak period driving was reduced 22 percent, and acceptance by the participants was surprising. Ninety-one percent of the motorists said they were willing to keep the device on their cars if the system was extended to every fuel station statewide.

Mandating retrofitting is extremely difficult. Cars are not created the same. It's like every car model is created from scratch. They do not have standardized ports, and they don't have standardized power systems. It's a weird thing to try to equip technology into vehicles. You have to be very creative. Some vehicles had to be excluded from the pilot project because they couldn't accept the technology. Mandated retrofitting is, therefore, extremely difficult at this time.

I want to talk about public concerns and the issues that came up in our pilot project. Actually, you can find all of these issues by going to one place: *The Washington Post*. It has a couple of great editorials from earlier this year. I think it was mid-February or early March, specifically. If you look at the comments you will see all of this. It is a great spot to go to get all of them. People are worried about the efficiency of the system. Is it going to be easy to pay? Is it going to be difficult? They don't know. Is everybody going to pay? Will some people get out of it? Are they going to scam the system? Are they going to unplug the technology? They are worried about all this. Of course, privacy is the number one issue. Fear of technology affects parts of the public that tend to be older. Younger people don't tend to be afraid of technology.

The rate structure is an issue. I had an interesting discussion with one of my old friends. I told him all about this, and I asked him what his concerns were. He ticked them off, and I resolved every one. He said, "OK, I get that, but I still hate it. I don't know how much I am going to pay." That is important: rate equity. Who is going to pay what?

Rural motorists want a subsidy. Road pricing is a difficult issue. You pay by the mile. People are smarter than you think. They know they may have to pay more by driving in peak period conditions, and that scares them. They perceive a large bureaucracy,

although our system is designed electronically, so it wouldn't have a large bureaucracy. That is the whole point.

Motorists' class wars. Rural versus urban. Green versus industry. Those issues come forward here as well. I used to think that flexibility of the system was a strength. Look what all these things can do. I then started to wonder about that because the public sees that as well. They see flexibility as danger; they can do all these things to me.

We identified all these issues ahead of time. We identified ways to resolve all these issues ahead of time. And people still don't get it. No matter how much I talk in the media or anywhere, no matter how much I put on the website, they still don't get it. They'll get a couple of things, and yet they know that the system is more than those couple of things. Then they fill in the blanks themselves with great fear. It is like a walk in the dark in unfamiliar territory. What do you see in the darkness? You see possible danger. So because they don't know every element of the system, they fill in the gaps with fear. And that is where there is real opposition to the system. It is not what we did or what we intend to do—it is what they don't know.

There are a number of things we have to do in Oregon to implement the system. The technology has to be refined, and the manufacturing has to develop. We have to make sure that the pay-at-the-pump model does not disadvantage the fuel distribution industry. And, of course, our system does not have a collection mechanism for electric vehicles and it has to.

We also want to investigate alternative approaches. Lately, I changed a bit of my thinking on this whole thing. We developed a closed system. Oregon's system is a closed system, not an open standard. And I changed my mind on that. I wrote a paper for the Transportation Research Board (TRB) Executive Committee in January that basically advocated that closed system. Since then, I have rewritten that paper, and now I think we should strongly investigate an open system. I think there is more likelihood of public acceptability in an open system, and I didn't want to go into that here because this is about the past and I'll talk about it in the institutional panel later today.

Thank you.

Matthew Kitchen

*Program Manager for Development, Data Systems and Analysis Department,
Puget Sound Regional Council (PSRC)*

Before I talk about our study and before we look forward, let's look back in history one moment. There was a time when if one were financing new roads, for the most part you got together with your neighbor and you would build a road with what resources you had available or could gather together, and then you charged someone who wasn't your neighbor to use that road. To a large extent this was the practice until the advent of the automobile. And suddenly we needed better roads, and more roads. At first,

municipalities, and then whole states, began to try and find ways to generate new revenues through taxes and fees for vehicle registration and their use.

The federal government had a role trying to maintain its federal interest in the roadway system. And one pervasive effect of this involvement is still with us: the prohibition on the tolling of interstates and federal highways. In some respects, it was this prohibition on tolling that engendered the need to institute fuel taxes. So this history began in Oregon with the fuel tax in 1919 and very quickly went to most states. Within 10 years every state had a fuel tax. It took the federal government a little longer to get there with a number of failed attempts at instituting a federal fuel tax, which finally succeeded in 1932. The fuel tax was never meant to be the way that we were going to finance this system. It was just an interim step. It was a feasible way to generate revenues but not really the best way.

Jim described very clearly the advantages of the fuel tax, and there are a lot of them. However, in addition to the fiscal weakness of the current system, there has been another issue, which is that the relatively low flat rates that are applied to all mileage simply don't address one of the fundamental issues that we have in the Seattle area: a significant amount of roadway congestion. And this congestion is related to finance in a number of important ways. Because we don't generate revenues where and when we need them, we have a very difficult time in satisfying the roadway demand that results. And we are in a sort of vicious circle.

We are very consciously trying to address not just the fiscal weakness of the fuel tax but also trying to understand better the implications of charging more directly for road use in a way that can control the congestion problem.

Our intent was to implement a behavioral study and, in order to understand behavior and do this with a rigorous research methodology, we knew we needed a very flexible toll system. We needed to implement a toll system, but not so much because we wanted to design a system that would replace the fuel tax but because we needed to have a system in place in order to measure and understand driver behavior.

We knew we weren't in the business of developing software and hardware, and we operated under a time restriction for the federal pilot program so we very quickly turned to the private market to see where there was an existing toll system that provided functionality for us. We selected Siemens, which supplied devices used in the Germany heavy vehicle tolling system. The back end is, of course, very different. Our primary purpose was to understand the implication of putting a charge on every road in our urban region, where those charges vary by time of day and by facility. So we had a road network of nearly 7,000 roadway assignments, each with a unique toll. We had to simplify this because this wasn't understandable. We ended up with the toll structure depicted here in the graphic with toll rates that were much higher in the a.m. and the p.m. peak periods. Tolls were higher on freeways than they were on the arterial network. But we were tolling both freeways and arterials. That is the basic toll structure.

How did all this work? What we did was we recruited households randomly. We recruited just under 300 households with over 450 vehicles. We told these folks that as part of this experiment they would have some equipment installed in their vehicles. We recruited participants for about 18 months of participation. Once we equipped their vehicles, we left them alone for about six months and we collected baseline information about their driving patterns. And after we had a baseline we gathered them all together and we said, "This is how the rest of the study will proceed: For the rest of the study you are going to have a bank account with real money in it. It is an electronic account. You can log in online and find out what your account balance is. But the deal is that for the next ten months, wherever you drive, we are deducting funds from that account depending on the time of day you are driving and facilities you are driving on. At the end of those ten months, whatever is left in the account, you take home."

The idea was to create an economic incentive and obviously to hold them financially harmless; otherwise we would have no volunteers. We needed to create a real economic incentive because we were looking to understanding the response to the prices.

The system itself, from a technical perspective, is a device in the vehicle which receives GPS signals. It locates the vehicle in space and matches the vehicle to an embedded map of the road network. It then looks up a table and assigns the right toll rate. It can display that toll amount in the device so that there is an immediate cue back to the user that they know they are being charged. The information is stored in the device and then sent through the cellular network to the central office. So, unlike the Oregon example where no information was stored or transferred, the very premise of our study was to have differential pricing on different facilities and necessitate essentially a record of trip making and the communication of at least some level of detail. While it doesn't have to be the exact location or the exact facilities that are being used, some detailed information about the road use must be sent back to the central system in order to generate a bill.

In essence we operated a toll system without the enforcement component, which is an important dimension of a toll system. But in all other aspects we were operating a toll system, a small scale one, for about 18 months. We had a customer service center where we received calls from participants on a regular basis. We had over 100,000 devices and central system communications, so we had an extensive task of operating the technical system. In total we collected around 750,000 individual trip records from these households. And we conducted a number of surveys as well.

The real purpose, of course, was to understand driver behavioral response, so we will spend a little time talking about this. We have an incredibly rich database of information about response to variable tolls. We have the ability to display this information in a sensible way. We have the ability to understand not only some aggregate information about response but disaggregate behavioral response across a number of important dimensions. We understand, for example, demand response as a measure of the amount of trips that folks made or the change in their total trip making. We have the ability to understand changes in start times of trips. We understand the response in terms of how much in tolls they pay, essentially the elasticity of the revenue yield from this toll policy.

And we understand something about trip chaining, the degree to which folks have combined trips in order to avoid toll conditions. We can understand all of these dimensions across a range of trip purposes, including your commute type trips and your non-commute type trips. We expect those responses to be quite different from each other, and they are.

The primary explanatory factor is, of course, the toll cost. We essentially have created models from this data where the toll costs are the key explanatory factor. We can understand other explanatory dimensions, like household composition and income, that allow us to understand how these responses would vary across household types.

So, in aggregate, what we found was a 12 percent reduction of total VMT and less reduction in the amount of trips or tours that folks made. This might seem small, but when you overlay this on the network, where people are avoiding certain types of travel the most, you see the opportunity for pretty significant savings and gains in terms of congestion reduction.

We also can observe something directly about people's values of time. Of course, folks were making some explicit tradeoffs at the margin between cost and time. The standard research on this has suggested that somewhere in the range of 50 percent of your wage rate is a reasonably good, average kind of assumption about values of time to use in estimating the cost of congestion or even in creating models to explain behavior.

We actually found considerably higher values of time than some earlier research, somewhere in the 75 percent range of the wage rate. This has been important for us as we develop other tools for examining toll policy in our region. We are obviously thinking about other kinds of implementation for tolling, not just this aggressive form. It is important to us to do some studies with pretty reasonable values of time. These findings are consistent with more recent research coming out of analysis of high-occupancy toll (HOT) lanes, so we feel very confident about what we are finding.

We've also observed directly shifts in time of day, in terms of trip start time. The conclusion here is really that the closer folks' originally typical departure time was to a change in a toll structure, the higher the probability of a shift in their departure time as a result of the tolls. In other words if there was a reasonably good opportunity to avoid a higher toll by making a small change in their departure time, their probability of doing that was actually quite high. This diminishes quite quickly when their typical departure time is further away from the opportunity to avoid those charges. Basically, we are seeing results that are in the right direction. We are seeing folks that are making changes that are modest but important.

So what do we think the implications of all of these arguments are for road management? First, we developed a cost model of the full implementation of such a toll system. The cost model itself tells you a couple of things. One of them is that it is true that a system like this is, of course, not without cost. We've developed a very conservative approach in order to make sure we weren't accused of underestimating the costs and particularly with

the operation side of things. We assumed that when you pay for cellular service, you would pay retail rates. That's pretty absurd but is about as conservative an assumption as you can make. We expect the cost to be quite a bit less than what we were estimating.

With some basic cost assumptions, and some ability to extend our behavioral findings to a full regional scale, we can examine costs and benefits directly. We've estimated the benefits in travel time savings over a 30-year implementation period to be in the range of about \$37 billion, with a benefit cost ratio of over six. If you had any other type of transportation project that has a cost benefit ratio of six, you would implement it.

The opportunities are enormous for our region as we have a significant congestion problem. This is not true for every regional environment. We've estimated revenues from this kind of system; again this is modeling for the year 2010, so if we were to implement this next year, we will be generating somewhere around \$3 billion in revenue. Compare this to the fuel tax, where our annual regional share is somewhere around half a billion dollars.

And clearly with the simplicity of the fuel tax system, the cost of implementing it is so low that a broad toll system is not going to compete in terms of administrative efficiency. So you have to count on the other gains you get. In our case the estimates of travel time savings for users are a way to justify this.

We've done some further work where we tested the implications of just a uniform per-mile tax versus one that varies by time of day and by facility. This is work we are doing right now for our planning process in our region. So we are jumping ahead; we are modeling the future, 2040. The two scenarios we tested have comparable revenues, and yet the variable charging has travel time savings benefits that are two and a half times greater than the benefits you get from a flat fee.

Two things of importance: One obviously is how much better is it to have some flexibility/variability in the toll structure or the rate structure that tries to control for congestion problems. But the other is that you still have positive travel time savings even with a flat fee. That suggests, at least for our region, that our road network is undercapitalized. So there will be great opportunities, in the future, simply from reducing congestion, even in a fairly crude manner that does not differentiate meaningfully by the facility type.

One of the most important things that you learn from a system like this, and it is something that you do not know when you levy your fuel tax and frankly would not know if you simply had a flat rate across your network, is that we know where in the road network we generate the revenues. So for the folks that were in our study, we know exactly which roads they used, which roads they were willing to pay for. We know where the revenues will be generated. And, as is frankly not surprising, you generate most of your revenues on a fairly small number of facilities, at least in our region. With our topology this is not particularly surprising.

Yet, half the revenues are generated from a fairly broad distribution of roads in the urban area. This tells us that if you toll just your high yield roads, and didn't toll other facilities (which would obviously yield considerable revenue loss), the diversion opportunities are considerable. This is undesirable. And frankly this is a primary reason why, as we move in our region to increasingly toll our highway system, we will have to find some way to solve that diversion issue.

On the issues of public opinion and public acceptance, we did some before and after survey work with our study households. We asked folks about what percentage of the revenue should come from directly charging the users. In the before experiment survey the response was somewhere in the range of about 40 percent, and in the after experiment survey it was somewhere in the range of 50 percent. So we moved people slightly as a result of their involvement.

We also asked them about how strong their concern for privacy was, where 1 was low and 7 was high. The mean response didn't change from before and after the experiment. But we drove people from the middle of the distribution to the outside. And this is, I think, revealing, because these folks spent 18 months with this toll system. They may have never really thought about this issue before, and suddenly they were spending a lot of their time in their vehicle pretty much unable to ignore the fact this system was collecting information about their travel. We drove some people out of the center and some of them decided this wasn't a big issue for them at all, while others said, "I really didn't think much about it before, but now that I've lived with this, this is a problem."

So what can we conclude? We are still doing a lot of work with the study data, making it available to other researchers, to make the best use of it as possible. Some of the conclusions are pretty simple and straightforward. We did see a real opportunity to address congestion problems through differential tolling. The technology worked, and we had no problems with the toll system. Technology is simply not a barrier in this area, but there are lots of details in terms of system design. This is not going to be a problem in implementing a system like this. But there are a lot of other things that need to be proven.

An assumption that the public sector is going to be in the business of hardware development, of software development, billing, all those other things—this strikes me as probably not likely. The public sector should probably do the things that we do well, and all those things are not the things that we do well. So there is a lot to think about in terms of how, if ever, we would structure such an approach to implementing this approach to tolling.

Ultimately, public acceptance of the underlying concept is really going to be what is important. We tend to think of public opinion as sort of static. I am not sure that is particularly meaningful. I think we are in an evolutionary phase here in communication with folks. We are going to learn a lot of things, they are going to learn a lot of things, and we will see where we go.

Thanks. We have our summary report available on our website, or if you want hard copies we can mail you hard copies. Thanks.

Dr. John Kuhl

*Professor of Electrical and Computer Engineering, Professor of Public Policy,
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Wherever I go and talk about this, I always follow Jim Whitty on the program. He always says all the important things and I end up just adding some incremental differences about what we are doing in the Iowa Study. I am going to start today by pointing out the most fundamental difference between our study and Jim's study. Our black box truly is black. That's critical. Actually, I think probably the biggest difference between the perspective we have and the perspective that we heard in both of the previous talks is that we are fundamentally focused on looking at those issues that are the basis of a national implementation. By that we want to potentially encompass not only collection of federal fees but also state level fees in an integrated basis.

Much of the genesis of this study is definitely due to David Forkenbrock's leadership. I also want to acknowledge my co-investigator, who unfortunately was not able to be here today.

So I am going to start by telling you some things that you already know, and that is the fact that the motor fuel tax has been the primary bedrock funding source for US routes for 70 or 80 years. In some cases it has provided 90 percent of the revenue to the Highway Trust Fund and provides a large percentage of the revenue for state and local levels in very different ways. Now, the reason I point out the state and local issue is because, as you all know, the states take very different approaches to how they collect motor fuel tax and how they use motor fuel tax revenues. State motor fuel taxes vary from nothing in the state of Alaska to approximately 40 cents per gallon in the state of California. There are also a number of local jurisdictions, counties, and city jurisdictions around the country that impose additional levels of motor fuel tax. For instance, in the Chicago metro area they impose a county motor fuel tax as well as a city of Chicago motor fuel tax.

States are also different in the way that they calculate the rates. Some states use flat per-gallon fees like federal tax. Some use percentage-based fees, and some use a combination. So there is a great deal of variability, and this picture certainly points that out.

The reason I make that point is because any system which is going to function on a national level and is going to have the participation of the states, is certainly going to have to deal with (and certainly have the flexibility to deal with) these state level differences. We should expect the states will want to continue to assess differential fee rates, and we can assume the states will continue to want to calculate those rates or base those rates on different factors. And we can assume that a federal system or a national

system meets the capability to calculate and portion those fees back to the state as well as county local jurisdictions in a fair and equitable manner.

Some additional factual constraints that we need to help frame the discussion about implementing a national-based system and the scale that is involved in implementing something like this are that there are over 250 million registered vehicles in the US, and the average age of these vehicles is approaching 10 years. This means there are a lot of old vehicles out there, which means that it takes a long time to flush old vehicles out of the system. There will continue to be vehicles from substantial ages of more than 10 years old in the system for a long time. That adds a very important implication facing a mileage-based system, if that mileage-based system is going to involve new manufactured technology. This is something that we have to think about and hopefully we will discuss in greater detail later today.

Remember that 250 million vehicles travel over 3 trillion miles a year, and I'll come back to talk about this in a second. But the average driver pays amazingly little in motor fuel tax. In fact, the typical driver pays only about \$20 a month in motor fuel tax, and most people don't have any idea of how much they pay in motor fuel taxes. If you ask people, the average citizen will give you wildly varying figures which are usually much closer to a quarter of magnitude higher than reality. The fact is it is a very effectively hidden tax, but it is actually a relatively modest tax. And that adds implications for efficiency, and both the earlier speakers talked about it. If a pump is collecting \$20 a month in fees or something on that order from an individual, then the cost involved in the transaction on an individual basis obviously has to be quite small. It better be an efficient transaction.

On the other hand, if you look at the aggregate problem, the total added revenues that are generated by the motor fuel tax at the federal, state and local level, then there is a billion dollars a year. So there is a huge amount of revenue being generated, and that, of course, has implications for robustness, reliability, security of the overall collection system and the infrastructure associated with it. If we are going to do this on a national basis, then that mileage-based system must work everywhere, it must work for everybody and it must work all the time. There are over 160 thousand miles of just federal highways in the US, the vast majority of which are rural two-lane roads. If you expand that to state and local level, there are over 4 million miles of public roadway in the country. Then of course a national system needs to operate effectively on all 4 million miles of that roadway and serve everyone or address everyone who rides on those roads.

Numerous federally chartered commissions have come to the unanimous opinion that the highway trust fund is on a path to insolvency and that something pretty drastic needs to be done both in a near term and even more so in the long term. These federal studies have all unanimously recommended that in the long term the best answer seems to be switching to some form of mileage-based charging system. So that sort of lays the context for our national evaluation study.

The national evaluation study that we are conducting at the Public Policy Center of The University of Iowa—over this two-year span we have involved 12 test sites around the

country with around 2700 participants. The goals of the study are two-fold. First, we want to provide a preliminary feasibility assessment, and that is primarily looking at the technology and techniques involved. Is a system like this robust enough and reliable enough? Do the basic technologies involved work? Does it give enough confidence that we would want to go forward with this on a large-scale basis? But I think more importantly, what we want to do in this study is to assess public attitude and acceptance. Look at the public issues, political issues and policy issues that are involved in a system like this. It kills me to say this, as an electrical engineer, but in the long run, the political argument shapes up here. Whether or not we move into a mileage-based charging system is ultimately not going to depend upon the technology. The technology would be there. We still have very different discussions about what is the right technology, but I think most of us have confidence that we can solve the technology problems. Ultimately, the real hard issues are going to be the public acceptance issues, the public policy issues, and the political issues. So we've tried to provide some basic evidence for some basic understanding that helps frame that very important debate and argument that has to go forward.

This study actually started more than a decade ago, and Jim briefly mentioned the pooled fund study done by 15 state departments of transportation in the Federal Highway Administration that actually started back in 1999. In fact, Minnesota Department of Transportation (MnDOT) was the lead DOT. That study resulted in a document that was produced which outlines sort of the basic architecture and idea concept for a mileage-based charging system. And based upon that we went forward with funding, in 2005, the authorization act for national evaluation study, which is what we are conducting right now. Now, this study is looking both at technology issues as well as public acceptance issues. So in addition to looking to fundamental technology we are looking at robustness issues of the system. Privacy and security have been discussed already, and I'll come back and say a little bit about this.

The transitional phase is a very interesting issue. We have a relatively old vehicle fleet on the road, if you look at the average age of cars. And if you want to transition into new technology in vehicles, exactly how are we going to do that? Are we going to be able to have a transition period where we are running both the old system and the new system simultaneously?

The public policy ramifications are, of course, public acceptance issues. Now let me just real briefly run through each of these and talk about them. In terms of the robustness issues, if you are talking about a system which is going to collect \$80 billion in user charges a year, then it better be robust in the sense that first and foremost it better be accurate and reliable. It better function everywhere effectively including all different environmental conditions, urban canyons, rural areas, etc.

It better be secure because it will be a target for fraud and evasion, both on the individual level as well as more coordinated attacks, and hacking as well as even cyber terrorism as it would be a very fundamental piece of the country's public infrastructure and, therefore, vulnerable. So that has to be a primary consideration in designing a system like this. I

always tell people that I think it would be about five minutes after a system like this is developed before there would be an ad on a popular mechanics magazine that says, “How to beat the gas tax.”

Privacy and public acceptance—we all know that privacy is the key issue here. I don’t think there is any doubt about that. That is the most explosive issue. The immediate reaction you get from people when you talk about this concept, and rightfully so, is concern about privacy, and that is nothing new. I mean, we started to see this a decade ago when we first started to form this concept. We knew that this was going to be an important, upfront issue. Many people fear that the primary intent of this system is somehow rooted in the government desiring to track them, and it is very difficult to sway people of that fear. As Jim pointed out, the public does not understand the technologies involved. In fact, people have a very limited understanding of technologies like GPS, and the media often fuels these misunderstandings by misrepresenting the technologies.

There is a fundamental tension between protecting privacy and providing auditability. On the one hand, you want to protect people’s privacy and collect as little information as necessary and to send as little information as necessary. But on the other hand, people want to know that the charges being assessed are actually correct. In order to do that you need to provide them some evidence about how those charges were collected. So we have this fundamental tension between how much information you collect, how much information you provide to the individual and can it be associated with other auditability issues.

Next to privacy, I think cost and overheads may be the second most important issue over a system like this. Can it be made efficient enough and can the overhead cost be kept low enough that in fact it generates revenue without excessive cost? And the big part of that is the basis of enforcement basis. I think my comments on this will be discussed on the panel later today.

Phasing is a huge issue. I think both Jim and I, having thought about installing all this technology in existing vehicles, would argue that it would be difficult but maybe not impossible. The difficulty is to retrofit this technology to all distinct vehicles, and the best path forward may be to, at some point, mandate the manufacture or the inclusion of this technology in new vehicles. If that is the case then we have to deal with a long phasing period during which we have some vehicles on the road with the technology and some without, and we may run some under a dual system, which is an interesting technology challenge.

Defining the charging policy—I think Ginger said that once people get past the privacy issues, the second big concern the public has about this concept is fairness: “I bought my Prius because I thought I was going to have to pay less gas tax; now you are telling me I am going to pay the same as the environmentally irresponsible person that drives a Hummer.” In fact, there is a great deal of flexibility on the mileage-based system in allowing social scales for charging. That is one particular reason why our study happens to be in approximate neutrality with the gas tax.

Let me talk to you about the architecture that we are using in our study. It is not so different than what has been described in the previous studies. It's comprised of an onboard computer system, which itself consists of a global positioning system receiver, a GIS database that simply identifies the boundaries of all road use charge jurisdictions, and an associated rate table. All charges are computed on the vehicle, and there is a cellular wireless transmitting receiver for purposes of uploading charge information to the collection center as well as downloading updates to the GIS database and to the rate tables located in the vehicles. So the picture here is pretty much the same as what we saw previously: the vehicle is able to derive its location from the GPS system. We do not use the GPS system as the primary means of measuring distance traveled except in cases where it is necessary due to the limitations of the vehicle. In most cases computing distance traveled is recommended by using the odometer, but even then it is validated by the GPS system. The GPS system is used for validation purposes as well as placement of the vehicle within different charging jurisdictions. All charge rates are computed on the vehicle, and the vehicle-mile charge data is transmitted by a cellular data link to a collection point and network operation center. From there it is transferred by secure terrestrial link to a collection center. The office prepares bills, which are sent to the vehicle owner, who then pays those charges. Those charges then would be allocated back to the appropriate charging jurisdictions.

It is very important to know that, as in Jim's study, in our concept no GPS data ever leaves the vehicle. In fact, no GPS data is ever retained on the vehicle. Specific point data is maintained only long enough to compute the incremental charge updates. The only data that ever leaves the vehicle is aggregate charging data. So it is impossible in our system to specifically track the vehicle or to place the vehicle in any specific location.

We also charged refueling events, and this is interesting. We have to worry about how you run a system where people are still paying by the pump. Those people who are in the new system are paying by the mile and shouldn't have to pay the tax twice. So we are actually investigating the potential to capture refueling events and refueling amounts off of the vehicle diagnostic bus, which is available in most new vehicles, and using that as a basis for rebating the amount of motor fuel tax which is paid at the pump in most situations.

Charges are uploaded on an opportunistic basis, so it's not necessary for the vehicle to be in range of the cellular data service. In fact, we can retain information on the vehicle for as long as several months in case the vehicle has to be out of range for an extended period of time.

The particular simulated payment service which we are using in our study is billing, but it is certainly by no means the only way in which you can implement the payment.

We also regularly download updates from the GIS database into the rate table to the vehicle over the wireless link. That's necessary because, particularly at the state level,

charges change on literally a monthly basis. Particularly on those states which assess their taxes on a percentage of the price of fuel as opposed to a fixed rate.

We use quite sophisticated data encryption techniques to make sure that system privacy is protected during all the wireless transmissions. Even though this is a concern, there's no rocket science here because, of course, we are currently using these same network technologies for all sorts of secured transactions, such as banking services and other types of applications.

In our particular study we chose a charging policy which is in neutrality with the gas tax or approximate neutrality with the gas tax. People will be paying about the same amount of charges in the current day. In order to do that, we established 20 different charge classes. Each vehicle is assigned to a charge class, based upon its fuel efficiency. Then the mileage charge rates for that particular fuel class are set to provide neutrality with the amount of fuel tax that a vehicle in that class would pay.

We do have the capability to handle multiple levels of charge jurisdictions. In fact, we will actually be operating in the metropolitan Chicago area where there is both a state, county and city tax assessed on top of the federal tax. It would be quite easy to integrate this system to other road financing and management options like congestion pricing or electronic tolling. We haven't done that in our study, but it is a relatively straightforward thing to do. Of course, the technology is independent of the type of vehicle propulsion system or fuel type, so it is certainly compatible with the expected nature of the future in which we will have different types of systems on the road.

A little more detail about the study—this is a two-year study. We kicked it off in the fall of 2008 with 12 sites nationwide—six sites in year one and six in year two. We are currently in the field in year one. Between the two years we are going to have a total of 2700 participants among the sites. Each participant will have a mileage-based charge system installed in his or her vehicle for approximately 10 months.

The billing system here is actually simulated in the sense that there is not a real financial transaction involved with the participant. Instead, we send them simulated billing statements on a monthly basis. In return we ask them to fill out questionnaires. The questionnaires have information related to the overall acceptance of the system and quite specific questions about how they like different levels of detail on their billing statements, etc.

The six sites for the year one of our study are here in Austin, San Diego, Boise, Eastern Iowa, North Carolina area and Baltimore. These sites were selected for a number of demographic considerations to provide an appropriate mix of urban and rural areas, city sizes, population sizes, age demographics, income demographics, etc.

During year two we will go to six different sites. Tentatively, four sites that are selected for year two are Portland, Miami, Chicago, and Wichita.

Some of the demographics that are new to the study design are participant age, sex, level of education, income, driving habits and a number of other things. The subjects are compensated for participation in the study, and that compensation is tied to their faithfulness in filling out the surveys and doing other things that they are supposed to do.

I will mention that the onboard units are professionally installed under the dashboard as they would be in the real system. There is no black box or white box sitting on there or anywhere that they could see it. We are not quite to the point where we can give you any actual and carefully analyzed data. But where we are right now is we have 1200 participants in the field. These participants were selected from over 40,000 people who applied to be in the study. I was amazed at the level of interest among participants. We started to install units in October 2008 and completed installation in December 2008. Today, we have over 5 million miles reported, which would account for approximately \$120,000 in collected user fees. This summer we will recruit 1500 new participants and train them. We will begin year two installation in August 2009 and complete our operation in early fall of 2010. We expect that over the two years of the study that the total report of mileage will be in the order of 25 million miles.

Let me give you some preliminary observations. These are not scientific and are not based on careful analysis, so please take them in the appropriate manner at this point. But at least they are very strong indications that, as we previously saw in both previous reported results, the principal level of acceptance of mileage-based charging appears to increase the longer they live with the system. Participants appear to like the openness of the system. The fact that they get a statement at the end of the month saying how much they are paying gives them some indication on why they are paying this charge. On the technology side, we have some real concerns about the accuracy of GPS as a means of calculating vehicle miles traveled. There may be some technological solutions to that issue, but at least for now we found that the vehicle odometer is substantially more accurate. As Jim pointed out, retrofitting the onboard unit to a wide variety of vehicles has proved to be a very daunting process. We've definitely learned that bus standards are not standard by any means and that modern vehicle electronic systems are very fragile. It is certainly a difficult challenge to take a piece of technology like this and sort of deeply integrate it into an existing vehicle.

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The Federal Perspective

Tuesday, April 14, 2009

JIM MARCH

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As we look into the current status of the Federal Highway Trust Fund and the question of what we are going to do next, many are looking at long-term alternatives to the fuel tax, including a mileage-based user charge. There couldn't be a better time to have a symposium like this to discuss this particular issue. I too would like to recognize Dave Forkenbrock for his contribution to this area.

I am going to give you, as the program says, a federal perspective. But I have to tell you, I am not going to give you a United States Department of Transportation (USDOT) perspective. The administration this year, as you all know, is very new. We had one controversy over mention of this particular tax. The administration is very, very busy on things like the economic recovery. We haven't had time yet to develop a firm policy position with respect to a mileage-based user fee. But I will try to reflect what understanding I have, having been with the Federal Highway Administration for almost 40 years and having talked with numerous people.

I want to talk about a number of topics, first on the importance of having a sustainable revenue source for transportation programs, and in particular highways. Some of the issues are related to the coordination of federal, state and local agencies and the private sector. This is going to be one of the big challenges: trying to figure out the relationship between a federal tax and state taxes for each of the states and the potential to implement local taxes much more broadly given the technology. I will talk a little bit about the transition to a more sustainable charge including mileage-based fees.

We already talked about the importance of fuel tax in the overall transportation financing system, which is particularly true at the federal level. Fuel tax revenues account for more than 90 percent of federal Highway Trust Fund (HTF) revenues. The fuel tax is not the only tax of concern. The failure of HTF revenues to keep pace with outlays is a concern. The federal excise tax has gone down precipitously during the economic downturn. The trust fund balances continue to fall. There are increasing disparities in the miles per gallon for different vehicles on the road, which contributes to making the fuel tax less sustainable. We saw this last fall when the trust fund was about to become insolvent. We had to develop plans to postpone payments to states because the trust fund balance could not be sustained. Fortunately, Congress came in and transferred \$8 billion from the

general fund. We are approaching a similar situation this year, and unless something is done, the trust fund balances are going to be in danger of being insolvent.

The gas tax has been the primary means to finance highways for many, many years at the state and federal level, and that is for the most part is still true. Many of you will recognize, however, that you get to a point where the revenues are insufficient to meet the needs. How long can you hold out not increasing the gas tax? Certainly 1982 is similar to the current situation. At that time there were a number of things done to create an environment where we could increase the gas tax. However, it has been getting increasingly difficult to get legislatures at the federal and state levels to approve gas tax increases. During an economic downturn such as what we now face, it is particularly difficult to ask motorists to pay more in fuel taxes. The current situation is just unsustainable.

(Referring to presentation)

Desirable revenue characteristics—first, we need to be able to raise sufficient revenues to fund these massive surface transportation improvement programs. There are very few taxes that really can do that. Revenue sources must be reliable. They should be economically efficient. They should reflect the cost associated with the use of transportation. They should be easy and not too costly to administer. Revenue sources should be equitable and should be accepted by the public.

This is a chart I put together to compare fuel tax and mileage-based charges based on these criteria. It turns out that both the gas tax and the mileage-based charge have the ability to raise the kinds of revenues that you need to support major highway programs at the federal or the state level. In terms of reliability, I think the mileage-based charge comes out a little ahead, simply because in the future we are going to see increasing fuel economy, which is going to erode the gas tax revenues. We are going to see alternative fuel vehicles. These kinds of issues will not affect mileage-based charges. Economic efficiency also favors mileage-based charges. We are charging directly for the amount of travel that takes place, not just the fuel consumed. There are many opportunities to construct mileage-based charges so that they can address congestion.

Administration is clearly a gas tax strongpoint. The cost of administration is much lower for the gas tax. Equity is about a wash, which is what most experts conclude. I heard mention of the rural areas and driver concerns about the mileage-based charge. Since they are getting charged for the gallons that they burn driving those long distances in rural areas, I am not sure that they present a strong argument for retaining the gas tax or opposing the mileage-based charge. Public acceptance leans toward gas tax. The users don't like to have the gas tax raised. It is going to be a tough sell to get them to understand and accept the mileage-based charge. The tendency seems to be for us to look at the mileage-based charge as a silver bullet. But I think that many of the same difficulties that we face with the gas tax are also going to be faced by the mileage-based charge. We still need to raise revenues at all levels of government. Just imposing a revenue neutral mileage-based charge is not going to get us out of the situation. We are going to have to increase our transportation revenues. We are still going to be subject to

inflation, which means that the mileage-based charges are going to have to be indexed or we are going to have to count on being able to increase the mileage-based charges periodically, what with increasing needs and with effects of inflation. It's not likely to be easier to raise mileage-based charges than it is raising fuel taxes.

Some of the potential applications—I think it is good to think about this separately as well as a package. I don't think everyone necessarily sees the whole package as the way to implement the mileage-based charge. Certain conversations that I had with congressional staff, frankly the ones that I've talked to at least, are not so concerned about being able to implement congestion pricing. They are primarily looking at it from a federal revenue perspective. What is the least costly way to transition to a mileage-based charge? The state user charges—I think those two can be viewed as a package or independent of federal charges. We need federal leadership. Implicitly, states would one way or another piggyback on the charge, but at the same time you are dealing with 50 different states with different views going in as to how to implement the mileage-based charge and whether they want to. If we start making assumptions that all states automatically are going to want to piggyback, there may be some difficulties with that.

If you are talking just about the federal tax, you don't need to worry about where travel is occurring. There are concerns on the hill about privacy, which is one of the big issues for them in seeing a path to getting this implemented. The notion of global positioning system (GPS) units in vehicles raises a red flag in terms of potential privacy issues. Basing a mileage-based charge on odometer readings might be more acceptable to some. Electronic odometer applications can be seamless. At least at the federal level, we really don't need to have location-specific information. Some conversations have also pointed out that, currently, state gas taxes are collected at the point where motorists purchase their fuel. They don't need to account for the amount of travel in various jurisdictions. That's another option: use the odometer readings and not worry about where the travel occurs. But many local areas are going to want to capture where travel occurs.

Facility-based pricing is currently being implemented without any GPS units, relying instead on transponders. There are ways to implement all these potential types of applications without building in the geographic specifics on the vehicle. I mention that not because I think this is the way to go, but it is the way some people are looking at this issue. We need to make a decision considering all of the issues, integrating all these functionalities into the technology and the way we implement these kinds of things. There has to be a conscious decision that we are going to enable various capabilities into the vehicles.

Pricing applications—congestion pricing, environmental charges, improved infrastructure cost recovery. I don't think we need to go into much detail other than just to point out that we could implement these various types of pricing now without the use of a mileage-based charging mechanism. It's not impossible to implement all these things. I think it is just a lot more efficient, perhaps, if we had an overarching framework where we could apply these various types charging to.

Pricing caveats—we could be implementing this much more widely than we are today. It should be common sense that there is going to be opposition. The concept of using mileage-based charges to implement congestion pricing would make it easier to implement, but in terms of public acceptability it probably doesn't get around the most important of the impediments. One of the conclusions of the Phase 1 study that Jon Kuhl mentioned was that all states recognized the value of implementing congestion-based pricing with the mileage-based charge. The consensus; however, was that we must go slowly and not immediately implement some of the advanced features of mileage-based charging. For many years there have been a number of people at the USDOT that desire the ability to have a federal weight distance tax. I don't think the Department would suggest that we go immediately to a weight-distance tax in connection with transitioning to a mileage-based tax. I think there are some real difficulties that need to be considered in how we market this and the functionalities that need to be highlighted.

Opportunities—there are also many opportunities in this area. Intellidrive uses many of the same technologies (formerly Vehicle Infrastructure Integration, part of the Intelligent Transportation System [ITS] program). There are opportunities to take advantage of the infrastructure that is going to be implemented, we hope, with respect to intellidrive technologies that would include vehicle-to-vehicle communications and vehicle-to-roadside communications. The same technology has been recognized to help support a mileage-based user charge, and there would be many benefits in terms of improving mobility and safety. That would potentially be a win-win situation to gain both revenue and improve mobility and safety.

Impediments—we talked about impediments and all of the problems with public acceptability. Users will see very few benefits. What is in it for the public? It is incumbent upon the political leadership to recognize that support is not going to come from the bottom up, but it has got to come from the top. We have to keep in mind that while we may want the perfect system that enables a variety of pricing and other policy objectives, we may end up with too a complex system that will be difficult for the public to understand and then support.

Administrative costs—there are now about 1400 taxpayers that pay the federal fuel tax while 250 million motor vehicles would be responsible for paying a mileage-based user fee. One consideration when thinking about administrative costs is that the more payers that you can get to contribute to pay the administrative cost, the lower the individual cost will be. If you look only at the cost of implementing at the federal level, that would be very high. But if you have a system that states are also using, and part of the functionalities you extend to not just fuel taxes but also in terms of mileage-based charges, you are suddenly spreading administrative costs over a much wider variety of users and at the same time reducing administrative costs to collect other fees.

Here are the main policy issues that I see, looking ahead. One is whether we go initially with a low-tech solution that perhaps doesn't involve GPS being able to determine where the vehicle was traveling, versus a high-tech solution. This will depend on federal-state coordination and the extent to which the states essentially partner with the federal

government in coming up with a common architecture that would be adopted by many or most of the states. Some want to pursue secondary applications immediately but it may be easier to implement an interim set of charges based on less complex technologies and determine a timeframe for full implementation. Another issue is whether to immediately substituting a mileage-based user fee for the fuel tax or to phase in a mileage-based fee while maintaining the fuel tax for some vehicles. Many would like to see this kind of fee implemented sooner rather than later. The American Association of State Highway and Transportation Officials (AASHTO) and the Transportation Research Board talk about a 2020 timeframe for when we could start implementing a mileage-based tax. But there are those who would like to do it earlier.

Questions of phasing, whether a single system or dual system, where you collect the mileage-based charge as well as the fuel tax, and transition strategy—there is some interest in implementing an interim system to get people presumably accustomed to paying a mile-based tax. This would be based on odometer readings. Some have suggested that you could piggyback on vehicle registration renewals, but this would be difficult in some states since they require registration every three to five years and then handle registration by mail or internet. When you start thinking about that you have to look at the benefits of doing that versus the administrative costs. There is no compelling case for implementing an interim fee, but phasing the implementation of a comprehensive mileage-based user charge could be considered. .

How can we begin to make this transition? What might be required during the next six to ten years to implement a mileage-based fee? Many people see the need for a major study to evaluate competing technologies, the different ways that you might be able to implement and administer a mileage-based charge, doing some considerable outreach to the various stakeholders that are involved, identifying one or more candidate system architectures to support the chosen applications, and then conducting several large-scale pilot tests involving all user groups and applications envisioned. Multi-state pilots to see how mileage-based user fees might work when you cross state lines could also be considered. The Delaware situation is important. Based upon all that work, we could have a report to Congress completed and sent to them before the next re-authorization cycle that would provide them with recommendations. They could act upon those recommendations, and regulations could be issued relating to the kind of vehicle equipment that could be required for implementing a mileage-based charge. At the end, this is just a very crude framework but is one potential path to get from here to there. We don't want to underestimate the amount of public outreach that is required. Think about the number of public service announcements related to the transition to digital cable. This is a much bigger deal than even that. I do want to emphasize that within the DOT we are still working very hard on a new authorization proposal. We are certainly not there yet, but there is no position right now on whether or not we will include anything related to a mileage-based charge in any kind of re-authorization. We are considering it and we have research underway. Thank you very much.

Questions & Discussion

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1. I was very interested in your comment about how there are many challenges with the existing fuel tax system that would transfer from fuel tax to a mileage-based tax system, challenges such as ensuring that charge rates are applied at the right period of time. I was thinking myself that there are very few unique characteristics of the fuel tax system that wouldn't transfer also as a challenge for the mileage-based. One would be reliability and the other is connection to who is actually being charged. What is the specific role of mileage-based user fee systems in relation to electric vehicles? Is that potentially the right interim charging system, to only charge vehicles that don't utilize fuel provided at the pump? Should we only charge vehicles which use fuel?

Jim March answers:

We would want to start charging not just the electric vehicles but also all vehicles, just because there are such discrepancies in vehicle fuel economy that exist right now. Right now it is a very inequitable task. It wouldn't be cost effective to try to develop a specific tax just for electric vehicles. In the long run one of the benefits of a mileage-based charge is to be able to charge not only for electric vehicles but also for vehicles that are using a variety of other alternative fuels. I would not see this as being something you want to apply just when we get to the point when there are electric vehicles. There are many opportunities to improve efficiency by applying mileage-based user fees to the existing fleet and more directly relating fees that each motorist pays to their actual use of the road.

2. This second bullet on the last slide—you are saying there is currently no discussion in the administration or the DOT authorization. There are strong recommendations from the policy commission that the next authorization include significant changes. Both recognize that you can't do this in the next re-authorization, but it needs to address the framework so the following makes some changes. Why does the administration need to be convinced that a federal government mileage-based user fee is the way to go? Is it possible that the re-authorization proposal might not address mileage-based user charge?

Jim March answers:

Yes, that's possible. I would be very surprised, however, if various bills that are floated would not make reference to a mileage-based charge.

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Luncheon Address: Findings of the National Surface Transportation Infrastructure Finance Commission

Tuesday, April 14, 2009

ADRIAN MOORE

Vice President, Reason Foundation

Member, National Surface Transportation Infrastructure Finance Commission

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Good afternoon. It's interesting to think about where the federal government now stands. Jim's comments right before lunch put a fine point on it. They've said we won't raise the gas tax. They said we won't move towards vehicle miles traveled (VMT) fees. But we want to spend more money. I don't know. That's an equation to me that says we are going to pay for transportation out of the general fund in this re-authorization. That is my prediction. I'm sticking with it so far and we'll see. Maybe I'm wrong. But I think there is a strong chance of some big changes as we will be moving in the direction of VMT fees in the next re-authorization. Hopefully, the U.S. Department of Transportation (DOT) wants to get its political appointees on board and can actually engage in a draft bill and can work in some of these first steps. The nice thing about what needs to happen in this re-authorization, at least in terms of federal implementation, is it doesn't require a commitment to go to VMT fees. So they are not necessarily incompatible. But what I also want to talk about here, over lunch, is kind of how well the commission has done and the conclusions we've reached and the thoughts we've haggled with. How do these correspond to the three question format that Ginger laid out?

I will assume that you'll read the report. I am going to focus on the VMT parts of the report. Let me just say upfront that we had a very specific charge from Congress, and that was to draw up what, not how, we should be doing to fund the federal transportation program in the future. And frankly given the time we had we had to mostly rely on our own volunteer effort. We didn't have money to commission a lot of research or hire a lot of staff. We had a hard enough time just figuring out a systematic process for looking at all the alternatives and coming up with conclusions about what we should be doing to fund the federal transportation program. We were not really able to get into how. Under the law, the commission continues to exist. We can continue to work as a commission until six months after this April. So we have another six months of officially sanctioned existence, and we are interested in continuing to engage in this issue. We would like to spend that time not only talking about our main report but perhaps working on something like this path forward concept. What is the state of thinking in the transportation world, essentially, about what needs to happen over the next 10 to 15 years, whatever it takes to transition?

There is sort of a need for a state of the knowledge on transition, which is really what this symposium is largely about.

The commission was an interesting experience. If you take a close look at the members of the commission, it was a pretty odd mix. There were 15 members. About half were pretty-well-established transportation experts of some kind, and half were folks that were appointed because they thought they would bring some perspective to the commission. We had this difference in people who really didn't know a lot about transportation but were very interested in. We were fortunate that nobody was appointed who didn't really want to play. Everybody really got involved, which is nice. Then we had a county official, a city official, a state legislator and a couple of folks who had served within a DOT and other federal positions. So we had a lot of experience from the different levels of transportation, and we also had pretty far opposite spectrums in perspective in transportation. But we agreed on at least 60 or 70 percent. We were able to reach all of our conclusions unanimously.

Context—everybody knows our conclusion. Our conclusion was, in the long run, the way to pay for transportation is the mileage-based user fee. We started off kind of wrestling with a lot of questions, but you can condense them, such as who pays now? What is the good, bad and ugly of the current system? What could be better in some alternative system? Who would pay? How would it be used? Many of the things that have already come up this morning were obviously bubbled to the top in our considerations. We thought in terms of both the defense of the status quo and good reasons we should be doing something else, whatever that something else might be. We were constantly reflecting on “OK, this is painful, this is technologically difficult, and this raises a lot of public opposition.” And yet, “as opposed to what” was a constant question that kept haunting us. So there is no “silver bullet.” Clearly, as you sit here today, just within the narrow confines of “how's the federal government going to pay for the federal share of the transportation program going forward,” you have no desirable options whatsoever. They all stink, but we have to pick the less stinky option. We have to pick the least bad option. There is no really good way to do this. It's all difficult and problematic.

You can criticize the gas tax for a lot of things, and you could defend the gas tax for a lot of reasons. If you look at it, these are the last few years of estimates of revenue going into the highway trust fund. And you can see it's all over the map (*referring to presentation*). There is kind of a consistent downward trend, but the juiciest one is the actual revenues. Even the projection that got close, January 2009, was still not very close. So it is not a very predictable source of revenue. And because it's fundamentally intended to be a source of revenue that drives a planning process, there is a real disconnect in there. You can't have a planning process based on something when you don't know what it is going to do. Things don't mix.

David, did you ask the question that don't all the problems with the gas tax map to the VMT?

Audience member responds: Not all the problems.

Adrian Moore continues: I would say, yes, actually the majority, maybe 80 percent of the problems of the gas tax, map over to the VMT. So what's the deal? Well, a) I'll take 20 percent of the reduction in problems at this point, and b) VMT charges have some advantages that the gas tax doesn't have. So there is a real difference between the two, and I think that is important.

What we did was systematically identify all potential federal funding mechanisms, which, of course, do not cover the entire universe of possible funding mechanisms that you could implement at the state and local level, but it covers most of them. We end up including a lot of things that state and local levels use to fund programs. We established a series of evaluation criteria, and we went through in Chapter 3 of the report and systematically looked up the pros and cons of all of these mechanisms. What we discovered is that there are not many mechanisms that really could be part of a sensible federal transition funding program. And most of those in that strong category don't raise enough money to be the core of the program. Once you've started thinking about the pros and cons of those in the long run, that's when we got to the VMT fee. Condensing a lot of work that a lot of different people have done, and a lot of what reports have said, the most sensible long run way of funding transportation is some kind of mileage-based user fee.

We had to address the short run by congressional mandate and, in the short run, using that process we concluded that there are only two ways the federal government can have more money to spend than in the short run. One is to raise the gas tax. Two is to use general fund revenue. We didn't recommend the use of general fund revenue, so the commission recommended raising the gas tax. I was not a fan of that recommendation. But that is essentially the two choices that Congress has if they want to increase spending, or even maintain current spending. In the long run, we should transition to a VMT fee for a lot of reasons. I've already mentioned that we are looking for the "least regrets" choice. In the 2020-2025 timeframe, if we have to make a choice today, 15 years from now, which of these choices are we going to look back on and pick ourselves the least over, because essentially it's not going to be all good? There's going to be a lot of cost and a lot of pain in the transition. We also thought, "Why settle for second best?" The gas tax is probably the classic example of a second-best pricing approach. We are at a point in history, technology and politics where we have the possibility to move from the second best to the first best.

There is an all-inclusive sustainability to VMT pricing systems, according to all of our evaluation criteria, that is just very compelling. And for some of the other commissioners, the fact that we are clearly on a technological development path in all kinds of sectors was important. This takes advantage of that, rather than saying, "Let's continue to use a non-technological means to solve this problem," which completely goes against history and progress. Technology is making almost every other transaction-based walk of life better off. Everybody essentially knows this. If you want to start the transition now, you need to take two re-authorization cycles to get there. You should start off basically trying to set a fee that is equivalent to the current federal gas tax on the federal aid highway system, and just basically make federal spending program funding whole with this fee at

the point where it is implemented. Worry about all the other stuff later. The more we thought about these additional charges for various kinds of externalities, we thought those may even make more sense if implemented at state and local level rather than federal anyway.

The chapter of our report that talks about VMT was essentially a fleshing out of our pros and cons analysis we did on all the mechanisms. We said there are a few things we want to devote the chapter to, digging in to those pros and cons. Financing was one because financing is such a hot issue, especially at the state and local level now, so as to discover what the federal government can do on that and that actually works with funding. It is not a substitute for funding. It is leverage for funding. And then the VMT charge.

So that chapter essentially walks through what we thought were the most important advantages and disadvantages. This is the list of potential advantages we discussed, and the disadvantages take two slides. And yet, we recommended it. So we are picking among the least bad options. I think most of these are pretty obvious and discussed already. When you start parsing things like the environmental benefits, it's both very compelling and very challenging. You can see lots of potential positive and environmental effects if you use pricing to price for externalities in a way you could for this technology, in a way you can't currently. It's not necessarily easy to do that. It's easy to think about. It's easy to see the advantages, but again implementation is a little bit tricky.

Most people don't really think about how pricing is going to interact with transit use. At least it's usually not a primary subject. But we spent a fair amount of time thinking about that and working with folks in transit to talk about operations. And I think it was an advantage to have Lee Sander from New York because there is a transit system where they also manage all of the toll bridges and toll facilities in the area. Unlike a lot of other transit agencies, they really engage in road and automobile use. Working through what that means for transit, the tricky thing is it's easy to say, "We flip a switch in 2020 and start road pricing." You are going to have a decrease in VMT, and you are going to have an increase in transit use. It takes a lot of work to figure out exactly what that is going to mean. But there are a lot of transit systems that are in no position to absorb 2 percent of automobile traffic in their area, or even 1 percent. So if VMT goes down 10 percent and only 10 percent of that shifts to transit, that is still more than what they have the capacity to handle. So are we going to fund them upfront to ramp up, to meet that need? Are we going to fund them out of this VMT fee? There are a lot of issues there. How do you manage those transitions? It gets real tricky.

Disadvantages and concerns—somebody said that public opinion is not static this morning. And I think that the huge overlay on these concerns is the fact that changing anything always starts off with a lot of resistance. The fact that the public opposes something and is so cynically manipulated in our political system is unbelievable. If you are for something that the public is against, then you spend all your time talking about public education. And a lot of times you are right. Most of the time people oppose something they don't really know about. And I'll tell you, I can't tell you how many

rooms I've been in, with how many people who stand up and jump up and down about the reasons they oppose VMT. And their reasons are legitimate, but their ignorance is amazing. People have strong opinions about it, and that is an issue.

A lot of the potential disadvantages and concerns are things that you have to deal with. These are things that unless we can find a solution to them, there is no going forward. When you get to the point where you are trying to implement this thing, you better have all of your ducks in a row, and that means you have to resolve these things. After two and a half years of talking about rural versus urban issues with VMT pricing, I heard a brilliant comment today, which was, "Let's just admit that the rural folks want a subsidy." That is exactly what it is. If you take just a few minutes and Google, and look at some numbers, you realize that rural folks already drive more, which means they already pay more in gas tax to live their lifestyle on a per-month basis compared to urban dwellers. They have much less fuel-efficient vehicles on average, so by at least two measures, they are already paying more. So there is a very good chance that a vast number of rural people would be better off under a VMT system and pay less. There will be winners and losers. We spent a lot of time talking about equity, social equity, rural equity, etc. And ultimately what it comes down to is none of them are really true in aggregate. But all of them are true for some folks. And a good part of the transition is going to have to be figuring out how to make that process not too outrageous and how to take care of the losers in some fashion, just like with route diversion.

Germany—they obviously talked about route diversion as they put their system in, and they went and thought about what are some of the most likely routes that they are going to divert to, and let's make those "no big truck" routes. Or local truck traffic only routes. And they didn't have too much of a problem with route diversion. So I think you could probably solve route diversion. That is not something the federal government is going to solve; that is a state and local issue, and it can be tricky. You can't solve it by just putting signs up. I end up being the guy in the commission saying, "Think about how the business model of the logistics industry works; it completely dis-aligns with this." We would wrestle a lot with that. We need to examine to what extent we need to change the way we price in order to take into account the fact that the logistics industry is structured the way it is and to what extent the logistics industry would sort of adjust to this charging system. Again, it's not trivial.

Double taxation argument—that is a huge response we get from people. And yet, almost the first step in every implementation that has happened so far is to see how people would react on this. Nobody is even thinking about doing this in a way that double taxes people, and yet that remains a huge concern. Convincing people that we are not going to double tax them is a challenge.

We put a lot of emphasis in our report on doing the studies, the technology development and the pilot programs in this next re-authorization. In terms of just the federal part of a transition to a federal VMT system, there's got to be a lot of investment in those three things in the next re-authorization. Given that, there is already a lot of tolling in the US, and it is growing. It is a small total percentage for funding, and it is a percentage of new

limited access capacity in the United States. It's about a third in the last 10 years. Tolling is a lot bigger part of adding new capacity in this country than more than a tiny percentage of people realize. So it's actually a fairly big player in the marginal evolution of our transportation system.

The lead from any state or local area on building a new freeway to building a new toll road is so huge. I mean even in Texas where toll roads have been really a part of business for some time. VMT is an orders-of-magnitude bigger deal than some new toll road and tolling some new facility in the area.

We made a series of recommendations. This process is going to continue over however long it takes to implement VMT fees. So at some point, when we do have a mileage-based user fee system, it's going to have to integrate whatever is happening meanwhile, which is all these individual toll roads. Maybe state VMT charges rise up before the feds got around to it. That is not trivial either, but is also a tool for transition, because to whatever extent federal government can encourage state and local government to move towards pricing, the more we resolve a whole bunch of these guys.

One of the most interesting things to me, as a researcher on road pricing over my career, has been in any place you put in any kind of pricing, people's opinions are radically different before and after, on anything you ask them that has to do with the pricing. It's a transformative thing to experience pricing. It changes people's opinions about all kinds of aspects of transportation. Whatever extent pricing continues over the next 10 years to be part of how we solve mostly state and local transportation funding problems, that's actually going to make a huge difference in resolving a lot of those attitude-based, perception-based and sort of the "how you deal with that in a realistic transportation system" problems that come up when you talk about VMT.

In a lot of ways, a big part of all of those concerns and those advantages is changing pretty rapidly. So you have to keep re-calculating the cost benefit analysis in a lot of ways. And you have to keep re-calculating what the problem really is. We have to solve at the margin, to make the next step feasible. I have boiled down a lot of the fundamental challenge with change we have, which has been stated in various ways already today.

Public resistance—people are not sure about the technology. And there are all these manifestations of resistance. There is a fundamental basis for that. Right now, trust, the taxpayer public's trust in the current transportation system, is really low. Transportation in the US is a "big fat waste." The problem is not as severe when you get down to state and local level. To me it is fascinating how people talk and poll on increasing the gas tax versus how people talk and poll on a local option sales tax at the city or county level to pay for transportation. Not that there is no overlap between those two sets of opinions, but their differences are vast.

When people know how much they are going to pay, where the money is going to go, and they can see what is being built and there is commitment and oversight, people vote yes. People vote for very specific things. People vote for local option sales taxes just to pay

for transit projects that can't be funded through the legislature because nobody thinks they are popular. But people vote for it when they say, "You are going to take this much money from me, and it is going to go to this thing and I can watch it being built." And contrast that to the gas tax system. You don't know how much you pay, you don't know where it goes, the only thing you know is that it goes to lots of crazy stuff and you know that you don't get as much as you pay. Nobody in their right mind is going to support putting more money into that system. Jim (Whitty) said "what's in it for me?" is the big question for the user. What do they get? How do we make them see this the way they see a local option sales tax?

How do we map that certainty and that trust that people have in that process up to something like a VMT fee? That is what we need to do. I am not saying I know how to do that, but I am saying that when I think about transition, I am increasingly thinking that that is the central problem. The technology, the accounting, all this stuff has to be resolved. People like us are mostly the ones that will have to resolve it, so it is very appropriate for us to think about that. But the legislators in Congress—those guys are not going to resolve those problems. They are worried about this. How do we get people to accept it? And people are not going to accept it until they believe the system is not going to give them the dirty end of the stick. That is why the German story is so instructive.

The commission was asked to resolve what the federal government could do. So we focused on a very top-down approach because that's what Congress called us to do. Our deal was all about how federal government could be the leader, to be the first one to implement it and make it happen. That is very worth thinking about, and very worth pushing. It needs to happen at the federal level at some point. It's going to take a longer time than anywhere else, so we need to start working on that. Maybe you think it should be bottom-up with a bunch of these states and even regions/metropolitan planning organizations (MPOs) implementing this. Now that will introduce some problems too. Integrating all those systems is going to be somewhat challenging. But we might actually make faster progress that way. I think the answer in a lot of ways is both. We have to keep pushing at the national level for how we are going to solve this problem, unless we want to commit that "you know what—the federal government is going to be less and less a part of the transportation system." And nobody seems to want to grab that bull by the horns. If they are going to continue to be 30 or 40 percent of the system, then they need to be 30 or 40 percent of the solution, and that means they will have to do this transition too. And because of the clumsiness of change at the federal level, driven by the re-authorization cycle, you can't fool around and just say, "We are not going to worry about the federal level; we will just move ahead in the state level." But you need to move in the state level meanwhile. You can't wait for federal government either, I think.

Thank you.

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Institutional Issues Panel

Tuesday, April 14, 2009

LEE MUNNICH, Moderator

*Director, State and Local Policy Program,
Hubert H. Humphrey Institute of Public Affairs, University of Minnesota*

JIM WHITTY, Panelist

*Manager, Office of Innovative Partnerships,
Oregon Department of Transportation*

ED REGAN, Panelist

Executive VP, Wilbur Smith Associates

JERRY DIKE, Panelist

Past International Board Chair, American Association of Motor Vehicle Administrators

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Lee Munnich

I think I have one of the most challenging panels, which is going to focus on institutional issues. I have three speakers that each could spend the whole hour themselves and have a great presentation and discussion.

Jim Whitty

This presentation is a very brief presentation of a 132-page report I did for the Transportation Research Board (TRB) Executive Committee. People are proposing odd things about mileage charges, including self-reporting of data and things like that or paying vehicle miles traveled (VMT) annually. There are just some really odd things being proposed.

But you have got to do these six things, no matter what. Every system has to do these things. Before you say you have got a solution, you have to go through each one of these. All six of them have to be done in creating a system. Keep that in mind.

What I've proposed to the TRB Executive Committee is what I call an evolutionary system. The elements that are necessary—You have to have the ability to create geographic and temporal zones. You have to have a central server or computer. You have to have connection to other databases that include vehicle information such as Departments of Motor Vehicles. You have to have an open system, an open platform for evolving mechanisms. You have to have data generation and data transfer, including an after-market device. We don't know exactly what the new system will be, but we know over time what it should become. So the system should evolve.

There are three basic models. Central billing, which covers all vehicles, has a high operation and enforcement cost. Pay at the pump is inexpensive in terms of operations costs, which is why we chose it in Oregon, but it does not cover electric vehicles. But there may be an integrated approach of both models which evolves over time.

Here is the model. Basically, it is an overlay of the pay-at-the-pump model with an upload of data any which way. (Short range radio, cellular or texting are possibilities for data transmission.) So you don't limit how the mileage data is transmitted; you only limit what is transmitted. The data goes straight to the central computer, which is more direct than what we did in Oregon. I don't think payment should be limited to collection at the pump. People are familiar with this process and it can be done efficiently, but there should be alternatives to pay-at-the-pump. This is how you can bring in electric vehicles for payment and also other charges. Other charges are difficult with collection at the pump because they no longer match up with the fuel purchase as there are congestion charges or other types of potential fees. It is best to allow an option for other payment methods in addition to collection at the pump. Over time, we want to be able to allow other payment options to evolve. Collection at the pump may be the default option. An after-market device will allow people to choose the level of service they want and also have other services associated with pay-at-the-pump: parking, insurance billing, time of day charging. Thus we should allow for after-market devices, either simple or complex with a lot of possibilities, and then allow those to evolve also.

Global positioning system (GPS) allows for the use of the area pricing system we used in Oregon, which doesn't have the problem of traffic diversion because a whole area is covered. If combined with pricing of specific roadways, you could have downtown core areas covered by area pricing and specific roadways into the downtown area covered as a specific roadway pricing. What I am suggesting here is a designer congestion pricing system to fit particular urban areas. Not all urban areas operate the same way. Design the system to fit particular urban areas. With the right GPS devices you can identify these designer systems.

The possibilities here are endless with regards to rate structure. You have access to vehicle databases and you know the characteristics of vehicles. You have computers and mathematical formulas. You can have congestion pricing and also environmental pricing. Let me go through some possibilities. Here is the basic problem that people have with mileage charging. Some people say, "You are removing the incentive to move to fuel-efficient vehicles." That is ridiculous, but still they believe it. Why do they believe there is a removal of incentive?

One of the consequences of a flat rate is that the arc of the gas tax ends up with losers being the fuel-efficient vehicles and the winners being fuel-inefficient vehicles. A lot of people hate that. But there are ways around it. For example, you can have a base rate and then have a multiplier based on miles per gallon. That creates the arc of the gas tax but maintains the flat rate on the upper end for higher miles per gallon vehicles. That could be a way to introduce environmental charges, which could be any such multiplier. The

point is that you can create various rate structures and do just about anything you want. There is even the possibility of using actual emission rates. This is a little bit more complicated, but it could be done. There is no way this potential system is anti-environmental. I think it, in fact, is pro-environmental.

Ed Regan

I'd like to make a proposal, and some of you have seen this proposal before. It is one possible solution that kind of covers or potentially addresses all the big-picture concerns associated with moving to VMT-based funding. I believe it does need to be a national system because I believe that we need to establish, if we're smart, a national pricing system. It should be one that becomes a national policy decision and the states can choose to tap into that. States and (this is the important part of my message today) any service provider or any mobility fee collection entity will find it to their advantage and cost effectiveness to then also tap into the system.

Everybody now knows that the gas tax system is at risk. This third bullet is an interesting point, and it was raised by a couple of different people in these commissions over the last year, and that is the inconsistency in national policy. The backbone of all transportation finance is dependant on the taxation of a commodity that we seek to discourage the use of, whether that is for purposes of reducing global warming or for energy independence from foreign oil suppliers. And there are other factors, from mobility to other reasons, which discourage the consumption of motor fuel. Every strategy, or many of the strategies that the federal and local levels have, is going to discourage the use of motor fuel, and right now our transportation finance is based on maximizing the consumption of fuel.

The policy commission reported in January of 2008 and indicated that the gas tax will be sufficient till about 2025. As you heard over lunch from Adrian, the commission is pushing hard to move to VMT. It is increasingly clear to me that America will likely transition off the gas tax by sometime between 2015 and 2025. I started thinking about this last July or so, and I have been making different versions of this presentation to different audiences to say, "What might that transition look like? How might we do it?" The key point here is that the problem with the gas tax is that it is an efficient way to collect revenue but it is not sustainable. All of the realities that we face for our future transportation work against the gas tax. If there is a compelling need to do it, even if it costs more, then how should we do it and what are the potential opportunities to pay for it? Nothing will be as efficient as the gas tax. Recognize this.

I would like to suggest a vision to establish a national transportation pricing system, one in which every vehicle, car and truck, in America is equipped with a fully automated electronic fee system that includes the capability price VMT as a replacement, not a supplement, but a replacement to the fuel tax. It can also be used for tolling and pricing and even transit fare payment and parking charges. And, ideally, it provides an opportunity for integration of Intelligent Transportation System (ITS) services for various

third-party users of the system. As I said, part of the system is to replace fuel tax, but part is to replace other charges as well.

There are many challenges, many of which we've already discussed today. The system is perceived as an overwhelming, technical complexity, but I don't actually think that this is as technically complex as people say. Privacy is a big issue. Enforcement and security are as well. And there are perceived high costs of deployment and operations when compared to the gas tax. There are also payment and collections issue. If we have multiple jurisdictions and multiple applications, one of the big things will be to ensure that we will all get paid. How do we redistribute that in an efficient way back to jurisdictions? How do we deal with people who don't have credit cards, bank accounts or charge accounts?

I started with the idea that says "let's establish a national travel card." This would be a smart card, and everybody in the country will get one (based on driving age or transportation age—the details could be worked out later). It would be an individual smart card and travelers would have their choice. They could establish a national travel account which would be linked to a credit card or bank account, and so forth. This could be somebody who is not really concerned as much about privacy. It would require no action by the user once opened. It could store balance or other electronic-type information on the card where cash is actually paid or is transferred at the time of vehicle usage, for whatever purposes. Basically, it is fully anonymous.

There are two things which are a little different here. One is the card reader that would read the smart card. The other is a proposal that probably is the most controversial part of this: an interlock so that if there is not a card in there, then you won't be able to start your car. We already have that technology available. It sounds very plutonian, but to be honest with you, if you look at the gas tax, if you fail to gas up your car, sooner or later you won't be able to start your car. In essence, it's in some ways the same. That information would be communicated by global system for mobile communication (GSM), cellular-type communication, and the VMT information would be collected by jurisdictions. Data would basically be downloaded, if I have a national account, to the account number with the amount of miles driven. If I have a smart card, I'm actually downloading revenue.

Envision a state-level VMT fee distribution network. Let's assume that all states buy into this. There would be a series of state networks integrated into a national clearinghouse to collect VMT information from motorists within their jurisdiction. This would function at the state level and potentially at a regional, local or even for special pricing zones.

All the state networks will be integrated to a national clearinghouse, and the federal government would also be integrated into it. Let's look at these jurisdictional issues. Illinois is an interesting example because, as somebody mentioned today, Chicago has a different tax than northeastern (NE) Illinois and so forth. And each county has an additional tax layout. That is a good example of how to do it.

For a typical jurisdiction—say NE Illinois region—everybody driving in the country over this concept would pay a federal fee, and then you'd have a statewide fee, northeast

region fee, city of Chicago fee, and congestion fee so that all motorists in the city would pay almost \$5 for a 50-mile trip. This system would actually be better from an equity standpoint because if there is going to be a charge, let's say added to a gas tax statewide in Illinois that subsidized transit in the Chicago area, then people in downstate Illinois are clearly not getting the benefit that they are paying for. But under this type of system the additional charge would be applied only in the Chicago region and not in southern Illinois.

The fees would need to be collected and re-distributed back to these jurisdictions. The other pricing functions that we have would be toll facilities, high-occupancy toll (HOT) lanes and managed lanes, parking systems, and transit. (If we use a card, we can use the card directly with the transit system.) You can also use your card for direct payment of taxis.

The key point is this: toll operators and any other third-party operators would pay for all of the roadside equipment that was involved in their particular application. Only the backbone system for VMT and the national clearinghouse would be established by the federal and state governments. Any third-party users may tap into this system, and this is where I believe we can pay for the system, as these costs would be borne by the individual users.

I am proposing as part of this that we add a dedicated short-range communications (DSRC) link, in addition to the GSM and the GPS-type system, for communication with the roadside reader. That may or may not be necessary, but my reason for doing so is that all these third-party providers will tap into this system. Once we have a world in which every vehicle is equipped with a national pricing and clearinghouse structure, that basically has a guaranteed payment mechanism, then virtually every parking garage, every toll road, every managed-lane system, and so forth will find it cost effective, by a wide margin, to tap into this. They would provide the roadside collection equipment. They would also provide a fee for that service. It would be cost effective for them but would also generate the kind of revenue that would offset the huge incremental cost of moving from the efficient gas tax to a more complicated and more expensive system.

Claims will be made by all different users of the system. All these people that tap into the system—operators, state networks, congestion pricing zones—will tap into the national clearinghouse, which will clear the process and redistribute the revenues to all the various jurisdictions. The accounts will be maintained at a national level and will be linked either to a credit card or bank account for transfers. To eliminate the collection issue I would say that we offer direct billing to commercial accounts but not to all the drivers.

People would have a smart card with a balance stored on it. We will have dozens of kiosks in different service areas, whether bank ATMs or parking facilities. This system would accept cash, credit card, or debit, but will have no information about your travel or anything else. What would the cost be? It would be around \$150 to \$250 per vehicle. That is about 1 percent or less of the cost of the vehicle itself, about 2 percent of the

revenue that will be collected from that device over its life. Initial set-up costs would be \$50 to \$70 billion, which is huge.

The system would replace virtually every other source of revenue. Only the onboard units and the clearinghouse structure will be financed through the national system. All other costs, such as local roadside applications, will be financed through the users of that system. And the operating costs will be probably \$15 to \$25 billion a year. That might be low, but that is after you reflect that probably half of that cost, if not more, would be borne through payments by third-party providers that will find it cost effective to tap into this system.

In summary, a pricing system is needed to provide a sustainable foundation for transportation finance in the future, per mile instead of per gallon. I would like to see a design that provides a single device paying for all forms of transportation fees and charges. The card will allow you to do that. It is a system that will link road users to payment and a system that would preserve privacy. It is a system that would allow third party providers to use the system to pay the bulk of the cost, at least the incremental cost, of moving from the gas tax to a complicated pricing system.

It will be a big investment, certainly more complex than the gas tax, but it will provide a sustainable future. The technology, as many people have said, is here today. All it takes is the political vision and courage to do it, especially at the national level. Thank you.

Jerry Dike

I want to talk to you a few minutes about how VMT-based fees might relate to departments of motor vehicles (DMVs). DMVs typically are standalone agencies and they are also on (or in) departments of transportation (DOTs), including here in Texas. About 15 states have them within DOTs.

Five things I would like to brief you on today.

1. talk a little bit about vehicle fleets;
2. DMV roles and issues;
3. opportunities in the VMT fee arena;
4. potential DMV national models; and
5. possible strategy towards VMT fee implementation.

Motor vehicle fleets comprise about 250 million vehicles in the United States with about 250 million drivers. Twelve million vehicles get junked every year, as it is an evolving fleet. In the past few years there have been 16 to 17 million new vehicle sales. Unfortunately, this year is 9 million, and it will probably get up to 11 million next year and approach 13 to 15 million in two or three years. The point is that it is a continuously evolving fleet. There are also 2 million plus new drivers each year. Here in Texas we have about 20 million vehicles: 9 million autos, 9 million trucks and pickups, and we also get a number of vehicles from out of state. It is a transient fleet, with a transient traveling public.

DMVs have many assets, such as a strong association with the American Association of Motor Vehicle Administrators (AAMVA), which is a sibling organization to the American Association of State Highway and Transportation Officials (AASHTO). Neil Schuster is here with AAMVA as its president/CEO. One of the other big assets that DMVs have is that they have a unique identification for every vehicle and driver in the United States. Almost all vehicles have a unique vehicle identification number and a unique license plate. Most of them also have a registration sticker, and many of them have a safety inspection sticker. Many have toll tags.

But all state databases have access to make, model, weight, fuel type, and (most importantly) address information (including e-mail in some cases) for vehicle owners and registrants. Many databases also have information available on average miles per gallon available, and many of them also have annual odometer readings that can be used.

Another asset that DMVs have is that they bill and communicate regularly to all 250 million drivers and all registrants each year and they collect billions of dollars. Here in Texas they average \$5 billion a year through the DMV. They also assist other agencies with vehicle data.

There are many issues facing DMVs today. There are 50 large, active DMV systems that encompass all vehicles. As such there are numerous billing, software, technical and operational standards for these large systems. The traveling transient public that we talked about earlier, both interstate and intrastate, compounds this.

Both public relations and public information are issues that have been discussed a number of times. There are data privacy issues throughout both the state and federal level.

A DMV can collect revenue from outside of a specific DMV area. They can also assist toll road agencies and tax commissions at the state level. Here is an example: for Austin, Texas-area toll operations, about 4.1 million toll transactions were tracked. Of these, 1.1 million were paid by plate/toll tag and half a million paid by cash. The DMV matched up these toll records to their own DMV information files and had a high percentage of success in finding addresses to bill transactions to. (There are also other ways to access this information.) Toll records showed 11.5 percent of transactions were from out of state or out of country.

There are several potential national models that might be of interest for the VMT fee community. On the driver side, one of the largest and most comprehensive is the REAL ID Act, which would have required everyone in the US to prove or re-prove their identity when they first get a driver's license or when they renew it. When introduced, it was very intrusive and controversial. The 50 states estimated a cost of about \$11 billion to implement, and it became a very famous unfunded mandate. Twenty-one states have actively opposed either all or parts of the REAL ID program and, at the present time,

Homeland Security is reconsidering if and how to implement it. It is a tremendous issue nationwide. Driver's license, identification, and security work for this program all became established over the two years following 9-11. AAMVA has developed 27 detailed references and reports on driver's licenses and identification standards, such as a best practices document on social security number verification.

There are also several compacts, such as the Driver's License Compact (DLC) and others, but some states don't participate in this program. (All of these are acronyms, but they are huge DMV systems.)

On the vehicle side, there is a standardized license plate, and this could be of potential interest to the issues of VMT fees. In 1925 the Society of Automotive Engineers went to AAMVA and promulgated the physical standard of six by twelve inches. AAMVA has a further standard that identifies the contents of plates. There are a lot of different license plates, but there are also a lot of standardizations. Yet, 16 jurisdictions still have plates that stay with vehicles versus 50 that have plates with owners. (The reason for more than 50 is that AAMVA also has the District of Columbia and all of the Canadian territories and provinces.)

The National Motor Vehicle Title Information System (NMVTIS) is another good example of a potential model. It was mandated in 1992, but after 17 years only 13 states have fully implemented it. Twelve have implemented partially and 10 have plans to do so in the future with 16 states having no plans to do so.

There are also potential national DMV models in the commercial vehicle arena. One of the best ones is the commercial driver's license information system (CDLIS), which requires all truckers, and particularly the hazardous material drivers, to have a commercial driver's license (CDL). All states comply with the requirements of this system.

There are a number of other DMV-based systems and frameworks. A good example is the international registration plan (IRP). A large trucker can pay his base state registration to his own state, and that home state prorates the fee that he paid, on a percentage basis, to the states where that trucker has driven for that year.

DMVs derive their authority from virtually all state agencies and local entities, Congress, United States Department of Transportation (USDOT), and other federal agencies. Authority is also derived from various state governors and the different state legislatures as well as assorted agency policies and rules.

Reciprocity agreements are also an important source of DMV authority because a lot of these activities are not covered by federal statute and are not covered by state law. Reciprocity, including reciprocity with Canada and Mexico, is needed because of the transient public that travels throughout these states and countries.

There are also well-established policies for standards, guidelines, best practices and other things.

Strategies for change moving forward include:

1. Make things clear to the public. Either we are going to have a revenue neutral system, a system that collects more, or a system that makes people pay their fair share.
2. Make it easy. Right now it is easy to pay at the pump, but we don't even recognize that we are paying that right now. If you bill people monthly, it makes it harder.
3. Make it popular. That is almost impossible to do with a new tax.
4. Make it mandatory at the federal level. National DMV systems take many years to develop and implement. It is difficult to get 50 state legislatures to agree, as they all want different things.

Thank you.

Questions & Discussion

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1. Did Oregon consider collection of the mileage fees at the DMV?

Jim Whitty answers:

Yes. The problem there was the operational costs. We decided to move to collect at the pump for that particular reason.

2. Renewal of registration is an opportunity to collect. Why not just submit the mileage of the past year?

Jim Whitty answers:

Self-reporting is problematic because of fraud and errors. Reporting mileage data creates large bureaucracy, fraud, and requires enforcement of those who cannot pay. I don't think it works at all.

3. The use of the open vs. closed terms and centralized vs. decentralized—how did the Oregon proposal connect the terms?

Jim Whitty answers:

A closed system is technology that works with itself, perhaps quite well. An open system is like the Internet, where new applications can come and new ways of using the system are developed. My suggestion is that the closed system may not be evolutionary, as it may be limited to the time it is implemented. Five to ten years down the road you may want a different system and you may not be able to move there very quickly because of the transition. While we did a closed system in Oregon, I think it is best to try to reach further for an open system and achieve public acceptance through voluntary means, not mandates.

4. *What is the probability that the state will implement a VMT charging system?*

Ed Regan answers:

I believe it has to be a national decision where everyone has the same system. It would be efficient and cost effective to tap into that system. For an individual state to develop a system, it would be more costly. What I proposed was a vision where every vehicle in the country is equipped, which I understand is expensive to do. A national framework is needed to establish common payment for all these different fees so that the users of the system, whether in Texas or Connecticut, basically have the same exact system. Under that model, it would be very logical to assume that each of the states will find it very cost effective and very efficient to tap into that system. But it still takes a national decision. It is possible for an individual state to decide to go ahead without a national system, and Oregon might be the state to do it because it actually developed a transition strategy and framework for a dual system. This is where the dilemma comes, because in my experience in talking with at least the past administration, people at DOT and policy maker folks, these folks kind of laugh at this idea that the Congress at the federal level would decide to do this. It is going to take the states to build it up from the ground up as a pilot program, and I think that is unfortunate. But you have this dilemma that the states can't do it on their own without a national decision, and the national government seems to want the states to build it from ground up. States need to push federal government to establish a national pricing system or some kind of framework to which individual states can then tap into.

Jim Whitty answers:

It depends on what the federal action is. If it is a strong reaction and everybody understands the pathway forward, then I think the states may sit back a little bit. I don't think those states that are working on it already will stop. But I think the political decision to implement would probably be dependent on the feds. The immediacy wouldn't exist if the feds weren't acting. A platform could be developed on the national level. That is what we want to see from the federal level: prepare a platform. A national move forward is critical. But if the federal response is weak, the states will act as if nothing happened at all. They may have to band together to push the national to act.

Jerry Dike answers:

I agree with my colleagues. It would be very difficult for states to implement. One thing that I want to mention—the license plate, stickers, or an electronic device could be issued to every vehicle in the United States in a reasonable period of time. GPS could be put aside if we want to use the DMV system. It would be very hard for a state to implement, like in Texas, in any given time. We have three-quarters of a million vehicles registered out of state or out of country.

5. *One of the things that hasn't been discussed in this panel is the strategies that may be brought voluntarily to the marketplace. Pay-by-the-mile, pay-by-use, GPS-supported or odometer-supported, parking garage pay structure or pay-as-you-go insurance... the voluntary strategies by which you can start to scale these things up without a federal*

mandate. How does the panel see these kinds of voluntary approaches potentially interfacing with pilot programs in the next transportation bill, which could also then lay a pathway or a roadmap for the national road user charging?

Ed Regan answers:

These may be helpful, and they can be done, but won't get us there. Use the word mandatory. The reality is the gas tax is mandatory, and if we are talking about a system that would replace the motor fuel tax as a sustainable source of revenue, then the fact that it is mandatory doesn't seem to be that controversial. There are many elements of it, such as privacy. Privacy has to be dealt with, and other issues. What is missing is a decision at the national level to begin the process of redefining how we do this. I agree with you that all those other things are good things, but I don't necessarily agree that we can afford to get to the ultimate new framework by baby steps. The ideas you are suggesting are good ideas, but I don't think those things are going to take us to the kind of framework decisions that need to be made very soon so that by 2020 or 2025 we are able to do this, because it is going to take a lot of time to get there.

Jim Whitty answers:

We can use voluntary means to get public acceptance. Pilot project are also helpful in this area. It may be that a pilot project gets permanent and doesn't go away. There are many more applications to a GPS-related device that you could have as you suggested. You attract some providers for the services, but you get them for free for the pilot project. And then the cost of participating with all this new stuff that tells you where you can find a parking place, etc., adjusts the fee structure. You could coax several thousand people to do this pilot program, and they will probably buy in.

6. Is it mandatory that we replace the gas tax, or is it mandatory that we have VMT? Everyone shouldn't have a meter. If we are going to change the taxing structure, we shouldn't force everyone to have a meter.

Ed Regan answers:

I respectively disagree. I think this is more. It is a new world. It is a world in which if we move off the gas tax and are smart about the way we establish a framework, and assume every vehicle is equipped, then this is a whole new way to do transportation. Local entities can start doing congestion charging, pricing strategies, financing or building new roads. It's a completely different world. That ability to fully manage demand and deal with this next frontier of how you do transportation, not just transportation finance, is going to be made a whole lot easier if everyone is part of the solution. People can't choose to participate or not. That doesn't sit very well in a lot of people, but I really think it is part of the system. My point that I don't get through to people is that if we are going to do it, let's do it smart and develop a way to do more than just replace the gas tax, so that same system can be used for many other applications like parking, etc. Third-party operators can tap into the system, and pay 10 cents per transaction to do it. It will offset the cost of the major change needed to replace the gas tax. Third parties can jump into the system for a small percentage of the fee.

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Public Acceptance Panel

Tuesday, April 14, 2009

LEE MUNNICH, Moderator

*Director, State and Local Policy Program,
Hubert H. Humphrey Institute of Public Affairs, University of Minnesota*

KENNETH BUCKEYE, Panelist

*Program Manager for Value Pricing, Office of Policy, Safety and Strategic Initiatives,
Minnesota Department of Transportation (MnDOT)*

MATTHEW KITCHEN, Panelist

*Program Manager for Development, Data Systems and Analysis Department,
Puget Sound Regional Council (PSRC)*

RICHARD TREY BAKER, Panelist

Assistant Transportation Researcher, Texas Transportation Institute

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Kenneth Buckeye

My experience with mileage fees goes back to the mid 90s when MnDOT was asked to do a mileage-based tax study. I do not know who the father of the mileage-based user fees concept is, but we had a legislator, Bernie Leider, who envisioned this concept way back in the early 1990s. Minnesota's mileage-based tax study was an outgrowth of his interest and concern. Representative Leider noticed that many motorists were registering their vehicles outside of the state due to the high fees. A lot of cars driving in the state were border state cars that were taking advantage of a very reduced registration fee in states like Wisconsin and North Dakota. So he wanted to say, "Let's just do away with the registration system and the motor fuel tax and start charging people on mileage basis." So we did a study on mileage-based user fees (MBUF) fees.

Today, many of the same issues still exist that were identified in that initial study. What is particularly problematic in trying to do a mileage-based fee alone is the border crossing issue. How do you collect from out-of-state vehicles? The results of that early work in Minnesota evolved into a pooled-fund study (with 15 states involved along with the Federal Highway Administration [FHWA]), which ultimately produced the report by Dr. Forkenbrock titled "A New Approach to Road User Charges."

Subsequently, our current governor has become very interested in this concept himself. As chair of the Western Governors Association, he followed very closely what was going on in Oregon and became very interested in that. At the same time we had applied to FHWA for a grant to study this notion because we thought it was a very important idea that was not going away. We were successful in receiving funding to conduct market

research on public perceptions and acceptance. We also had a parallel technical track going on, starting in late 2006 and continuing today. My colleague, Ray Starr, will talk to you more about the technical project currently underway later today.

The mileage-based fee market research has had several phases. In the first phase we conducted expert interviews, and, subsequently, we conducted two phases of focus groups. We are in the midst right now of doing quantitative market-level research that will establish a baseline of understanding regarding public acceptance of this concept, at least in Minnesota. We think this is going to be a long-term endeavour. We need to know if the public is moving toward support of this notion, if there is increasing acceptance of the idea. We have a research methodology that we think will help us determine the answer to this question.

What does the public know about transportation funding? There is a wide variation of understanding of what people pay for transportation. Very few people in our focus groups could actually tell you what the motor fuel tax was or what they pay on an annual basis for combined motor fuel tax and registration fees. People don't know what they pay right now. They have no context to know if a mileage-based fee is going to be a better deal or a worse deal for them personally. Their assumption is that it is going to be a worse deal. Of course, there will be winners and losers, but people do not know yet who they are. How would they know if a vehicle miles traveled (VMT) fee will be different if they don't know what they are currently paying? There is an urgent need for transportation funding and cost information to be disseminated. We need to help people discern their costs. That is part of what our research is going to do.

In our process of focus group work, we presented a couple of scenarios. First, we asked participants if the increasing trend toward alternative fuel vehicles presents a problem for anybody. They recognized that this is a problem, or were able to see how this may be a problem in the future. When they were asked, "How should we solve this problem?" their immediate reaction was, "You raise the gas tax"; you raise the taxes that you know. Their belief is that the gas tax is not broken. The lesson here is that we will have a very difficult job in convincing the public that we need to move from a system that is working to a much more complex system that is going to add burden and cost to their experience. There is a feeling that this problem, while real, is off into the future. They do not see the demise of the gas tax as an imminent problem.

Another insight, I believe, is that we cannot ignore the issue of today, which is revenue. And the only tools that we have right now would be tolling or raising the motor fuel tax. These are the two options the public sees. We have to be very sensitive that the public in general doesn't feel that the motor fuel tax needs to be replaced.

Within our focus groups we tried to help them to come up with a solution. "If we didn't have the motor fuel tax, what would we do?" Fifty percent of the focus groups were able, on their own, to come up with the idea of mileage-based user fees. Their reaction was that this concept is essentially "fair," or at least not inherently unfair. It is like a utility. They also recognized that there are significant implementation challenges, and we have heard

most of them today. There is nothing particularly new. Our research echoes much of what we already have heard today, but it was done in a more systematic and scientific way than over talk radio.

When asked about the fairness of the mileage-based tax, they said it was pretty much like the motor fuel tax in a sense. However, if a mileage-based or VMT fee were implemented, they would have all wanted to see a breakdown of what the different rates would be and what people would be paying. Their expectation is that the VMT fee would mirror the gas tax.

Let me give you some of the observations that I've made. The public questions the drastic nature of converting the motor fuel tax or even the registration fee to the mileage-based user fee. It is quite a difficult concept for them to grasp. So they are familiar with existing taxes, and their suspicion is that whatever this system is going to do, it will likely raise more revenue. In fact, they understand that we wouldn't be talking to them if it wasn't about more revenue. We have to be very honest with them on this matter.

The public's first fear under a complex VMT fee involving a global positioning system (GPS) is invasion of privacy and security. They also fear adding more bureaucracy to government, regardless of which way it is implemented.

A few years ago I took a course titled *Systematic Development of Informed Consent*. The first law of the instructor is this: any public policy, program, or project that doesn't address a serious problem is going to be short lived. The second law is this: a serious problem is a problem that affects your quality of life. If we are going to make the case that we need to do this, i.e., convert to VMT fees, I think we need to keep in mind that quality of life issue. A compelling argument would be that without the VMT fee, users should expect a decrease in performance of the system, less service on the system, or deterioration of the system.

Matthew Kitchen

Ken raised a couple of specific points. One is that it's probably not a compelling argument to say that we have to do something dramatic to replace the fuel tax if all we are going to do is replace the functionality of the fuel tax. Most of us, who spend a fair amount of our time thinking about issues in transportation finance, clearly see that there is a looming problem. That is not a compelling perspective for most people. Saying that the public sector will find itself challenged in finding the funds just doesn't particularly resonate with many people. So we spent a lot of time avoiding some of the fundamental points of the discussion.

When we generate revenues in the project we did (Puget Sound Traffic Choices Study), from tolling the use of specific roadways, we had new information available to us. We now have in the public sector information that we've never had before (where revenues are generated specifically). The question is, "What do we want to do with it (this new information)?" If we simply allocate programming decisions to a political process, then it

is not going to be compelling to tell people that we need to change the way that we generate revenues to finance that political distribution. We have an opportunity instead to focus politics on what it can usefully do, which is setting policy and not making programming decisions. And that is a really delicate subject. It is not something we generally want to spend a lot of time talking about.

When we did focus group work, yes, they mentioned privacy. Yes, they mentioned concerns about how fair this would be to different users. But what they really wanted to know is, “What are you going to do with the revenues?” People intuitively understand what it takes an economist to articulate in mathematical terms, where almost the entire usefulness of something like this is wrapped up in how you program revenues. If we are going to meaningfully advance the conversation, we have to treat people as smart, intelligent adults. Say to them, “Look, we need more revenue and we need to use it differently.” People aren’t particularly happy about the way current programming is progressing.

Not everyone is going to be happy with any particular distribution of revenues. The objective is to have a rational way to allocate resources. We can do that because we know where people value the assets (based on willingness to pay) and we can make the investments where they value the asset as opposed to simply saying, “Trust us, we’ll find something useful to do with the money that we get.” We all have a cell phone, and we accept the privacy issues as they relate to carrying and using a cell phone. I am happy to accept the compromise that this represents in terms of privacy because it’s a valuable asset. It does something for me that I am willing to accept. If we can’t convince people that there is an opportunity here (in terms of road charging), something that they value, then they are going to say they don’t like it because of the privacy issues, or because of the fairness of it.

We need a specific set of proposals about what it is that will fundamentally change about the way we program revenues and set policy. And that includes everything from the federal government on down. It is a big challenge. I don’t have a lot of insight into the specifics of developing a public acceptance program. But I do know that we probably need to assume that we have a set of constituents and users out there that are very intelligent. They are making choices already. They maximize their own interest. They might not know how much exactly they spend on transportation, but they have a pretty good barometer for value, and they know when we are not being straight.

Richard Trey Baker

I want to start my comments by stating that transportation does not rank very high on the lists of people’s most important issues. It’s not above the economy, it’s not above health care, and it’s not above education. It is a challenge. We are trying to change something that the public is used to (the fuel tax), and we are potentially poking a sleeping bear here. So what kind of strategies do we need going forward? I am not really sure. I am hoping that is something we can discuss here.

We did some research on public acceptability of mileage-based fees. We were not able to do it at the level of MnDOT, but we were able to establish a community advisory committee and hold two focus groups. The advisory committee was a group of citizens that met regularly, and we were able to present information and see how their opinions changed as they got different information and discussed different topics. The focus groups were conducted in the Tyler-Longview area, so our research effort had more of a rural focus.

At the time, fuel prices were driving a lot of the discussion on transportation, as when we did this study fuel prices were extremely high. So I don't really know to what extent people still care about transportation issues since fuel prices have dropped. It's likely that since we are seeing some low prices, transportation is not on people's list of priorities.

There is a profound lack of knowledge with regards to the fuel tax. Virtually no one is able to tell us what the amount of the federal or state taxes is. Nobody is aware of how much they pay in fuel taxes. There is also a strong lack of knowledge related to the funding process, even within the transportation industry. We tried to develop a flowchart that showed the path fuel tax revenues take from the point of collection to where it finally goes to the department of transportation (DOT). It was hard to find people in the DOT who could help chart that process. And this does not sit well in the public. It looks like a wasteful process. One of the most salient aspects of mileage-based user fees is that there is the potential for retention of local funds. Everyone thinks they're getting screwed. At least with a system such as this they would know what they are getting. It is transparent and it is something that can be understood, and there is justification for paying the fees.

There has not been any independent connection made between increasing fuel efficiencies and declining fuel tax revenues. It isn't something that people think about all that often.

We did have some privacy concerns expressed. A lot of people think that since this study was done in northeast (NE) Texas that there were going to be some farmers with guns that would hate this idea but, in fact, there was a very wide range of opinions on the subject. A lot of people didn't have a problem with it. "They are already tracking us with our cell phones" was heard more than once. There are also some people that do not know about this topic at all. It is important to explain how the Oregon pilot functioned and how they protected privacy. That was reasonable for a lot of folks. There is a potential to reduce concerns with respect to privacy. However, there is also that segment of the population that is not going to be happy with the government having any additional information at all. Right now we have an honest system. "Government knows absolutely nothing about me, and that is the way it should be." We are never going to be able to convince those people. There is always going to be someone that is not going to like this.

We didn't see much concern for penalizing drivers of very high fuel efficiency vehicles. Mileage fees were generally seen as fair; however, that did not translate into acceptance.

The potential for new administrative requirements was a big issue that came up over and over again. It all came down to “If it is going to cost you more to collect a dollar of mileage-based fee than it costs you to collect a dollar of fuel tax, then what is the point?” Wasteful spending was a recurring thing. “Bridge to nowhere,” “earmarks,” and diversions were continually mentioned: “How do we know these funds are not going to be diverted to more bridges of nowhere?” “What is different in a mileage-based system that is going to keep you from wasting the money as opposed to the fuel tax?”

What we are seeing now is this development of the need for added value. How do we tie in paying for vehicle insurance, or how do we incorporate real-time travel information into the system? The system needs to be an improvement. It needs to offer an added value over the existent system. How are drivers going to be better off? The network is going to be better off. The transportation financing system might be better off, and rural areas might get more money, but how is the individual driver going to be better off? That is something that we haven’t been able to establish yet.

Questions & Discussion

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1. Matt, thank you for this round. These are the most important findings we have seen in the past five years. Up until now we’ve known what demand has been for any various regional network. What we haven’t known is the value of that demand. This chart right here shows directly what the valuation of our system is. The question then, as we move forward for public acceptance, is do you believe that there is a way of taking that valuation and translating it in a way to the public that can help move the conversation forward to mileage-based fees or congestion pricing fees in this case? (Question refers to slide 22 of the Puget Sound Traffic Choices Study presentation made during the symposium’s introductory session.)

Matthew Kitchens answers:

I agree that this is the most important bit of information that has come out of our study. It is hard to have that conversation since you are still saying the public has to trust us. We are going to make a promise, and the promise we are going to make is that we are going to do things differently than how we’ve done things in the past. Any reasonable person will want to see it. So what we have to say, basically, is that if they want us to show them, they still have to trust us. The technical answer is that these are charges that represent the burden that people place upon capacity, which is a direct equivalent to what we need to do to solve the congestion problem. We need to make investments in capacity where capacity is justified. Separating pricing from finance is nonsensical. For me, it is nonsensical to talk to people about a flat rate as a replacement for fuel tax because it doesn’t get at the opportunity value that this entire situation represents. We need a true integrated solution to combine the finance and mobility management dilemma. And that has to translate to people as not being stuck in traffic. I am not paying for things that we don’t need. I am not paying for things that we could find a way to avoid by investing in some other cost-effective way. We are getting the most we can out

of our set of assets while also making sure that we don't impoverish them. We are not being miserly about this. We are saying we are going to invest in things but not everything. I am not all that hopeful in the near run. I think what we are more likely to face is a fundamental fiscal collapse, and it will be late and we will have to do something quick, and we may do the wrong thing. I think we could avoid that.

2. *(Statement from audience member): The current system we have pretends that when the metropolitan planning organization (MPO) has a series of public meetings, and 150 people out of a million in the area come to those meetings, that we have provided a plan that the public understands and embraces. The fact is they know so well how the system works and what is going on that they don't even have a way to compare what we are talking to them about. Local retention—if you imagine the system where when you get on a federal road you pay a federal fee—that kind of makes sense. And the federal system is going to determine how that money gets used. You have a state fee that pays for the state system, which is going to vary from state to state, but generally you have a little more faith in that system. It has more visibility and transparency. And then you get to the local level where it is going to be more meaningful. People right now, when the MPO or the county says, “We need to build this road,” will understand. It's still tricky how you talk about it and how you present it, but clearly it's more transparent. People who experience pricing become more supportive of pricing because you start to see how it works. You start to see the logic. You see how it fits into why the price goes up because you noticed you are starting to get slowed down in the morning. So if you are in the 91 express lanes in southern California, and it starts to get clogged up, and the next Monday the toll rate increases, you know why. All these things are very closely related. The beauty of VMT that we have to figure out how to get down to people is that it should flip. Right now we have a federal process that dominates decision making. If you go to a VMT system, if it is all well designed, local problems are solved mostly by local fees working with the states and feds. And that is something people can understand much better. What we can do is to implement this where your federal fee is only going to pay for the interstates, but it is just the interstates. All the rest of it is going to be a local decision. And people kind of know in a lot of ways how local desires drive a lot of the state's ways of doing. You start to get something that has real meaning to the average citizen, and the answer is, “What is in it for me?” That is getting to something that is more transparent and more trustworthy to people.*

3. *One of the problems with the gas tax is exactly this: if we move to a VMT tax and can recognize where people are driving, it will provide the indicator of where investments need to be made. Would this info be reason for the public to move forward into mileage-based user fees? When we talk about influencing public opinion acceptability, how far do we have to get there before it can be mandatory? How much public acceptance do you have to get?*

Ken Buckeye answers:

Based on the market research I have done, I would say none. And the reason I say that is because what we are showing here is 5 percent of the Seattle metro area system. So you are trying to build a mileage-based user system that has all of the bells and whistles, the

congestion management function, built in it. You know, 99 percent of the roadway system in Minnesota is never congested.

Questioner responds:

I am not saying that from the standpoint of congestion; what I am saying is from allocation of funding to where the demand for transportation is.

Ken Buckeye responds:

Another point—we have an annual survey, and it shows that over the course of the last five or six years, traffic and transportation have risen to the top consistently to the number one or two issue in the twin cities' metro areas. People think about transportation a lot; there is no question about it. They are not honed in on solving this congestion problem. The problem is that transportation is personal.

Trey Baker responds:

I don't see this slide as being particularly convincing for the public in NE Texas, but for a different reason, mainly because mileage-based fees were seen as a possible gateway to social engineering by the federal government. You have all this data about where we travel, when we are traveling, and with so much data showing where and when we travel, what's to stop you from a system management perspective from implementing social engineering? This idea of "abusing" the transportation network for social engineering did not fly all that well.

Questioner responds:

How much public acceptance needs to happen before you implement a mandate?

Trey Baker responds:

I don't know. In looking at the REAL ID, which was a federal mandate that, to me, is kind of similar to what we might potentially be looking at here, we have separate states and localities, all managing their own systems, and if a federal mandate comes down saying we are going to coordinate, it is going to be difficult. You are going to encounter the same problems. I am not sure what is going to happen in California, for example. There they have a proposal that will require Californian drivers to report their mileage. They wouldn't be charged for it; they would just report it and then that information would be used for other purposes. That would never fly here. It is very regional. I don't think you can aggregate public opinion. It is so regional that I am not really sure.

4. Jerry said to make it easy, clear and popular. What are the top three benefits to our constituents with respect to mileage-based taxing? I really don't know how we sell it unless we can articulate the benefit to the drivers.

Matthew Kitchen answers:

As a pure fuel tax replacement, they may say that they are going to get what they currently have. There is a lot of work that goes on to maintain the current transportation system and to make the incremental investment. We are going to make a transition that is going to be hard. It is going to be difficult. Things are going to be the way they are until

there is a fundamental collapse. Moving to a different way of financing things seems to be a better choice. There is some merit in that, but I have no misconception that that is a conversation we need to be having. I think there are huge opportunities. There are real limits to central planning. If we cannot use these revenues for useful purposes, we should go no further. If you do not use the revenue sensitively, everybody is worse off. This is a disastrous idea if we cannot be clear that we can use these revenues for useful, productive purposes that benefit people's life. If we can't do that, we should stop this conversation immediately because everybody is worse off.

Questioner responds:

From a revenue neutral perspective, how can we sell this idea?

Kenneth Buckeye responds:

What resonates is that we have got a threat out there on the horizon, which is alternative fuel and electric vehicles. We have a goal in environmental state law that is looking at reductions in energy consumption in Minnesota by 25 percent by 2025. Those two things seem to resonate with the public that there is a problem and it needs to be studied. Is a mileage-based user fee (MBUF) the solution? I don't know. It needs to be studied. The gas tax system is failing. MBUF needs to be considered and studied. I think that there are other applications that can be combined with mileage-based user fees that we are attempting to do with our administration in Minnesota, such as safety, traffic information and such.

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Technology Panel

Tuesday, April 14, 2009

KEVIN BALKE, Moderator

*Director, Translink Research Center,
Texas Transportation Institute*

DR. JOHN KUHL, Panelist

*Professor of Electrical and Computer Engineering, Professor of Public Policy,
University of Iowa*

SCOTT ANDREWS, Panelist

Cogenia Partners

RAY STARR, Panelist

*Assistant State Traffic Engineer for Intelligent Transportation Systems (ITS), Minnesota
Department of Transportation*

GLENN DEITIKER, Panelist

Telvent Caseta Inc.

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Kevin Balke

This session deals with technology and implementation of different technologies in the pilot studies. We've had a lot of discussion so far on policy issues, the inter-relationship with technology, and implementing those policy issues. We have four speakers here today that are going to talk about different aspects of the technology side of things.

Each of the speakers will come up and talk for about five minutes and present a little bit about their systems and about the design of their systems. It is hard to talk about technology without having some sort of picture in terms of architecture and things like that. I would like the panelists to focus on these three aspects as they go through their discussion: how they accumulate the mileage itself, how their systems communicate the mileage fees back to some processing center and how this processing center distributes the fee information back to the users.

Dr. John Kuhl

Just over a decade ago I got a phone call from my good friend David Forkenbrock, and he said, "I would like you to come over and work with me on this mileage-based charging idea that I am thinking about." I said, "David, I am an electrical engineer. I do not know anything about policy issues and transportation." He said, "That's OK, I just need somebody to help me a little bit with technology, and I will take care of the policy

things.” It didn’t quite work out that way in the end. But I have to say this past decade has been a very interesting and humbling experience for me, as an electrical engineer, pouring into this new world of policy. And it’s taught me a number of lessons, and I want to share a couple of these with you because I think they may have been discussed today.

First of all, technology is not a substitute for good policy. If you don’t understand the policy issues, if you can’t justify things on the policy-based system, then technology certainly isn’t going to save you. If our reason for pursuing mileage-based charging is just because we can, then we’re certainly destined to fail. We need to always keep that in mind as we go forward.

Technology has a very limited ability to change public perception. Many of the issues that we are dealing with here we can use to develop variable solutions for protecting people’s privacy. And we can be very proud of ourselves as technologists for having thought of these things and implementing them, but in the end if we can’t explain them, the people won’t trust them, and then we’ve done nothing. Solving the privacy issues is of no value if we don’t solve the perception of the privacy issue.

Technology is confusing; people have a limited ability to really absorb major changes in technology. To me, it’s clear that the policy makers need to be driving this bus, and those of us who do technology will be your obedient servants and will try our best to address the issues and problems that you bring up. I don’t think it is our role on the technology side to try to be too much on the forefront as to how this should evolve.

At this point of the day there is probably very little new that we could really say. I just want to catch the issues in this way and this is sort the basis for other discussion and questions. I see that there are five technology decision points that need to be addressed in developing a mileage-based system. First is how do we charge, how do we decide how many miles someone has driven, how do we report these charges, how do we move these charges from the vehicle to some collection point, how does the person pay the charge, how do we enforce the payment of the charge and how do we apportion the charges back to the appropriate jurisdictions?

Perhaps, more importantly, if you look on the other side of the slides, we can see the cross-cutting issues because these are issues that are sort of orthogonal to these five decision points. The first of all these issues is ubiquity. In other words, if we are going to do this at the national basis it needs to work everywhere, for everyone, and all the time.

There is a cost/overhead issue. How do you collect user fees from 250 million vehicles and do that in a cost-effective way that is not overhead? How do you maintain people’s privacy? How do you make the system secure and robust, resilient to various types of threats? How do you deal with evasion issues? How do you make this system compatible with others, like road pricing initiatives, that people are interested in pursuing? Etc...

If you look at charge accrual, the blessing in the curse of mileage-based charging is the global positioning system (GPS). On the one hand, it is sort of the basic enabling

technology that allows us to dream and think about all the things that are possible. And on the other hand, it's the one that holds us back in terms of getting public acceptance because of the fears of invasion of privacy. The fundamental technology question that has to be answered is do we get enough value from using the GPS-based system and providing specific location services to really make it worth the public liabilities? The answer for that question is clearly yes. So much of what people accept today is their vision. Their dream of the benefits and payoffs of this are based upon things you can only do with that type of information.

We move on to the reporting of the charges. What are the choices? The particular one that we are using in our study involves wide area wireless (e.g., cellular data links) because there is existing infrastructure almost everywhere in the country these days that you can tap into. We have also seen examples in the Oregon study of using wireless local area network (LAN) technologies, the use of a smart card. We have also seen allusions to using VII infrastructure, although I would point out that if you are going to use VII, you are not going to implement that on 4 million miles of public roadways in the country, so that is going to be a limited solution, or partial solution, not an entire solution to the problem.

We also need to keep in mind that technology is a moving target. We are talking about designing a system here that may be deployed in 2020, and almost everything about communication infrastructure is going to change radically in the period between now and then. It is a big challenge to think about a system that we can define in today's terms while trying to address the future.

There are charge payment issues. One of the options we have heard about is from the technology point of view where we are dealing with invoicing people. (We are working with a prototype system.) But there are some issues about the costs associated with that. We've heard presentations about the possibility of using designated payment stations and perhaps things like smart cards. How much information should we collect? What is the trade off between protecting people's privacy and allowing them to understand the nature of their charges? What about casually transient populations? Etc.

There are charge enforcement issues. How and when is non-payment detected? There are a number of things we could do technologically to identify situations or apparent situations where payment is not being made. We can look up at the history or track people's patterns and say, "It looks like this person is not paying their fees." What is the leverage to induce payment?

With charge apportionment we have to ask, "How are collected charges apportioned to the appropriate jurisdictions?" I haven't laid out any particular opinions in terms of what I think the answers to this are, but this is how we frame the problem. For any of these areas there is a whole range of possible technical solutions. I hope we can get to some discussion on any of these issues, but I am not going to stand up and necessarily say that I think my answers to any of these questions are the best ones.

Scott Andrews

I am going to talk about some technology that we have developed over the past few years as part of the VII proof of concept project in Detroit. This is now known as Intellidrive. It is a possible means for implementing mileage-based user fees (MBUFs). There have been quite a number of misconceptions and worries about how effective these kinds of technologies can be. What we did in the proof of concept involved implementing an on-the-fly tolling. Most of you understand that you can easily apply this to on-the-fly mileage-based user fee collection.

The VII proof of concept was an activity to validate safety, mobility, productivity and convenience. To build a system that could provide all of these with the same hardware and thereby really benefit users. I think we have seen this with intelligent transportation system (ITS) services on the side of mileage-based user fees, and that is what this is about. How do you get more benefits out of the same hardware and the same basic infrastructure and thereby reduce the impact of any of the costs associated with putting that system in place?

The approach that we did was we built a proof of concept set up in Detroit over a large area in the northwest portion. We did a whole series of tests with subsystems and services. And then we built a bunch of applications. We collected a lot of data, which I've been reducing over the past six months. This is a quick cartoon of the VII system. What we have is equipment on board the vehicle. We had the great advantage of having vehicle connectivity to all of the vehicle systems that we could want as well as dedicated short-range communications (DSRC) and a lot of computing power. Clearly, you need to reduce that down to a simpler system and make it affordable. Fifty-five different roadside units were distributed around various intersections. An infrastructure computer network system allowed us, in the case of the tolling system, to collect information from the car, send it back to the charging or payment service, and back on the network. Basically, it was an Internet-connected payment service. That could be a credit card based system or use a special account. You can imagine multiple ways to implement that. We also had roadside infrastructure, which is actually a processor located at the toll zone, and you wouldn't necessarily need to use something like that in the case of a mileage-based system unless you have to do very rapid transactions.

In this picture what we have is a series of freeways, which are the orange lines, and the red dots are the locations of the roadside equipment we used for freeway exchanges. The blue ones are a series of arterial roads in the same general area. This is actually in place up in the Detroit area, and we are hoping to make it available for people to do experiments.

Here is the quick explanation of how the tolling system works in this case. We used the same system for a parking application. You would enter and exit a parking area and you get charged. You get a token when you enter, and when you leave you pay a fee for how long you parked there. The red zone here indicated an area (you can make that red zone

as big or small as you want) that when you enter, you start to get information about how much you need to pay for, so the car doesn't know anything about the system until it gets into this red box. Then once it gets in the red box it finds out about the green box, which if you go through this little patch on the road, you are going to get charged. And this is how much you are going to get charged. That gets communicated to the driver through a user interface, a little screen in the car. They have the option to approve that payment, and then when you actually pass through the green box, the charge transaction happens. We did this completely end to end: a digital encryption process, encrypted from the car back to the payment system. People talk a lot about privacy, but there is no reason that you couldn't make an indirect kind of thing where you would have a third party that would get the information and figure out how much you are going to be charged and then charge you in some other ways so that no one actually knew who is paying a fee or where they were.

This is one of the interchanges—a very large interchange. There are little payment zones; these are the little green boxes. We have 10 different payment zones covering all kinds of places on this interchange. Some of them were actually independent lanes of the freeway; some of them were connected zones. People talk about GPS not being too accurate; these red lines are actually reports from the car that were collected as to what their position was. You can see that is actually exactly where the car comes from. We had 10 different zones. We did this at low speed, just entering and exiting the freeway, and also traveling at 70 to 75 miles per hour through these payment zones. We were able to discriminate individual lanes and pay different amounts for different lanes.

So there are some interesting cases here that I think are important, which point out some of the technical challenges that you have. These were particular cases that we set up and, in fact, the big shaded area is the plaza zone. Once you get inside that zone you are getting informed about all these little payment zones and then you decide, the car itself decides, whether it's in that zone or not. Once it gets close to it, it starts the transaction.

The top one here is the case where you have the frontage road right next to the freeway on-ramp, and we've all seen that kind of situation. We have a couple of different roads, and one of them is getting on the freeway where you want them to pay. In fact, one of these passes right next to the plaza zone, but you don't actually go into the payment zone because you are going to some other place on the road. We've actually acquired all of the information to make the payment, but since it didn't go through the box it doesn't actually execute the transaction. It is fairly good at discriminating who was where and whether they should pay. Another case is down here where the plaza was made intentionally a little too small, and the guy went out of the zone and went back into the zone and then went back through another toll plaza or another payment zone. The idea is to make sure he didn't get charged twice for having gone through two payment boxes within 10 or 15 seconds of one another.

Lastly, we had more of these adjacent roads. Here, we wanted to make sure that you didn't get bothered if you were, for example, doing pro data transaction or maybe some ITS navigation transactions. You don't want to have all your bandwidth sucked up by

doing a bunch of tolling stuff that is irrelevant to you, because you are not really in the plaza zone. So we had some cars moving on the road nearby, and we wanted to make sure that they didn't pay any attention to the tolling system at all.

The system worked, in general, very well with very few mischarges. We are doing another test, similar to California, at the Dumbarton Bridge. You have the actual toll plaza where people pay in cash, and we defined payment zones. You can see in the bottom here (red zone) and this is where we end up with two people that didn't pay. After a lot of analysis we found out that what was happening was that the gantry going across the freeway for enforcing a fast track was actually blocking the radio frequency (RF) signals. The only places where we ended up with a problem of missing a charge or charging somebody incorrectly were generally related to where we put the antennas and how we set that up. It wasn't related to the ability of the car to know where it was.

We were able to discriminate lane base payment zones. I think that is really important when talking about congestion-based pricing or, in particular, distinctions between the use of one kind of lane or another. It also means that you can avoid charging people driving on the frontage roads. We were able to execute all these transactions, even going all the way back through the network to perform a payment transaction. We were able to do this with cars running at full speed. They were at the plaza zone for only 10 seconds, at the most. There are actually more cases of what are called false positive and false negatives where you get this incorrect charge or missing charges that you shouldn't have gotten. We are very happy with the outcome, and I think it represents a good set of technologies to implement this kind of system.

Ray Starr

Excellent timing. We are just starting an MBUF project in Minnesota and finalizing the concept of operation and various requirements, so the things we hear today are useful for us. I have two different things I would like to talk about. One is integration with other applications. We think that is a good idea. Tolling system, mileage insurance, mayday, Onstar, navigation devices (tomtom, digital map, one-way receiving map), mileage fee, VII—how are these read? GPS, roadside communication, wide area communications, or digital map? How do we get these in all cars? We need to integrate these things. But the question is, “Do we really want to have a car with four GPS receivers to do similar things?” It makes a lot of sense to integrate these things.

Considering previous discussions of what the value of these things are, trying to convince the Intellidrive program that mileage-based user fees should be a big VII application is going to be hard.

If you don't have some of this equipment in the car, it can be very expensive. It's very expensive to implement if we have nothing, but many cars already have these systems, and implementing an MBUF would be easier and very cost effective. From the point of view of VII, we need to figure out how we do this project and how to bring in revenue. In Minnesota we are trying to demonstrate mileage-based user fees as a VII application

along with a couple other ones. We are looking at in-vehicle signing, safety application and travel information. What we are hoping to do is to build on consumer navigation devices.

Hopefully, we can get someone in that area that is willing to work with us to get the mileage off of the navigation device, report that with cellular communications, and then payment would either be billed monthly or billed with the vehicle registration. That will also depend on the enforcement mechanism. If you haven't paid your registration fee, then you cannot get your sticker. Police tend to see stickers that are out of date. That would be an enforcement mechanism.

The other cost-effective way to do mileage-based fees, besides using VII, could be the no-technology way. We are proposing to manually read odometers and then paying a flat rate with vehicle registration. There is ongoing discussion about self-reporting, but you could have government certified people that would read the odometer, so you wouldn't need self-reporting. In Minnesota we used to have an emissions testing program before you could renew your registration. You had to take the car into the emissions check. This could be less expensive than what that program was. They terminated that program, as they found out it wasn't doing anything for the environment.

That would be our approach, and there are some advantages to that. One is that you can implement that in a couple of years for all cars in Minnesota because it doesn't require anything in the vehicle. It would only be a recording of the identification number, the mileage reading, and a digital photo of the odometer. It is inexpensive. Another advantage is that it would be independent of the gas tax. One way to sell this is to say, "We need more revenue, and a mileage-based fee is a fair way to do this, to add a mileage-based fee that is not going to be obsolete in a few years." You could, at the year you start charging per mile, say, "We are going to reduce the gas tax by 'x' cents." This could be one way to have both. This also addresses the privacy objections. The odometer won't tell where you were driving and when. We take this as a good kind of default base case. There are some disadvantages. You will not be able to tell what miles were in the state versus out of the state. But in a way, we already have that with the gas tax. Neighboring states don't have the same gas tax rates, and we don't seem to be bothered by people crossing borders to buy gas.

If you decide to actually replace the gas tax, then mileage rate will have to be a lot higher than if you were just supplementing the gas tax. Only paying a once-a-year registration fee could be a hardship if you had a high cost.

To address all of these things we could have an opt-in program where, if you want to get into the program, we would put the device in your vehicle, obtain and record miles, and exclude miles driven outside Minnesota. So now there is a reason for you to want to get this. Are there enough benefits to you, in terms of privacy loss versus saving some money, to charge reduced rates if you are driving outside the Minnesota congested zones? You are getting a discount if you are not driving in the congested metropolitan area or

driving outside congested times. There is a lot of incentive to get in the program. That is the approach we are looking at.

The device that would be used is the same that would provide VII application. It would include in-vehicle signing for curve warnings, intersection avoidance collisions, work zones, and school zones. Navigations device manufacturers are already capable of getting travel time information.

In summary, the two things we are looking at are integrating VII and the mileage-based user fee and then also using this technique to take care of some of the privacy issues. If you don't want anyone to know where you are driving, then stay with the odometer readings.

Glenn Deitiker

I am the Toll Guy in Texas. I want to talk a little bit about maybe the third way. I am not suggesting this is an alternative to mileage-based fees. To the contrary, I don't think it can function as an alternative to MBUF or tolling. But I think it is an interesting concept for discussion as a mechanism for charging for small and specific projects.

Will \$100 barrel of oil come back? Or electric vehicles? It seems like this is happening around us. Will they become the majority of the traffic on roads? Who knows if the battery problem will be addressed? Will transportation budget surpluses come back? Most likely not.

Technology is not the looming factor. These are mostly political and public perception issues. Technology can solve all of the problems we are facing or any of these issues. It can collect the information for mileage-based fees, can process the transactions, can do it inexpensively and can do it so effectively. The question is, "Can we do it in a way that is acceptable to the politicians and acceptable to the public?"

This is the direction in which toll systems are headed. Toll technology is becoming a commodity. The systems five years ago cost an order of magnitude more than the systems cost today. Cameras are becoming less expensive. The next generation of camera technology is going to cost a fraction of what the state of the art system that was deployed only a couple of years ago cost. License plate recognition technology, mostly software, is becoming incredibly accurate. There are all kinds of new approaches that are being applied to license plate recognition. This is one of those exponential problems. That last 5 percent and that last 1 percent become very expensive. But in this case, the approach we are going to use is good enough. The last bid is transaction processing. This has been kind of the bane of toll systems for ages. Transaction processing, even electronic systems, have consumed a large part of toll fees. When those transaction fees start approaching pennies or even less than a penny, then we have a lot more alternatives in the way we approach tolling.

Here is what we are suggesting: it is the idea that you can toll a very small section of road at a very, very low toll amount, using nothing but cameras and license plate recognition. So, for example, here in Austin, 5th Street would be a great choice. You can go out and put a bunch of cameras on 5th Street and collect tolls, and let's say those tolls are 2 cents or 5 cents, or some tiny amount that would be used just for resurfacing that street. Collect those tolls over the course of some number of years until the project is paid. There is no toll agency, there is no toll overhead, nothing but a camera on a pole that collects license plate images and may collect radio frequency identification (RFID) information. It processes this electronically, and we aggregate the transaction into a larger transaction. That makes financial sense to process. We potentially have additional violation processing tools. For example, registration data can be used. It is a capability that local, regional mobility and other transportation agencies can use to solve the problem. If you have a small project that needs to be funded over the course of a handful of years, you can deploy a very low-cost toll system and charge people a very tiny amount, something equivalent to a mileage-based fee. Obviously, this is not the solution for the entire state. You are not going to put cameras all over the state. But for small projects (bridges, individual roads, and other individual projects) it is a very low-cost alternative.

It is not going to happen today. Transaction fees are still a problem in the toll industry. I think we are going to see a lot of change in that area in the next year or two. The camera technology has to come a little bit further. I think the license plate recognition technology is probably almost there. In a handful of years, probably in a year or two, it is going to be cost effective to do mileage-based technology with roadside equipment at a very low cost. Once again, I don't think this is an alternative to the mileage-based charging. It is not an alternative to tolling because I don't think this makes sense for large toll projects. We are collecting a dollar or two per transaction. When you can pay for a project with pennies per transaction, I think this represents a solution. I think those of us in the tolling industry that are watching what is happening, watching the commoditization and the reduction in transaction fees, see these kinds of approaches coming.

Questions & Discussion

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1. Moderator Kevin Balke asks:

We've seen a lot of different approaches and a lot of different policies, anywhere from the national level down to kind of getting very route-specific, user-specific type of information and charging fees related to that. We see an implementation window of about 2020 as the desired implementation window. We hear that technology is ready. What are the minimum requirements and functionalities technology must have in order to do this by these timeframes and at all the levels?

Scott Andrews answers:

Tell us the policies and we'll figure out the technology. I think we need some ability to determine the position of the vehicle. If you are dealing with large areas, charging for

entering a city center, you could probably do that without necessarily having a lot of positioning equipment in the vehicle. If you are trying to charge per mile, you should have the ability to collect the mileage on the car and also to validate that somehow because you know what people will try to do to get out of it. People will undo things in their cars and, because it's their car, they feel they have the right to unplug things or change things. So you have to deal not only with enforcement but also prevention. Of the 200 million cars on the road, some large percentage of those cars will have something wrong with the system. You need to be capable of finding them and getting revenues up. The rest of the technology really deals with how extravagant you want your system to be. What are the policies, and then you can make the system as simple or complicated as you need to.

Ray Starr agrees and replies:

I think the other piece is cost. You can build them, but it has to be affordable in the near future.

John Kuhl replies:

The technology is already there. The jury is still out on the enterprise cost structures. If there is an Achilles heel from the technology point of view, it will be in the cost of that infrastructure, not the cost of collecting the data on the vehicle.

Glenn Deitiker replies:

Bureaucracy is costly. If someone created demand for 200 million devices you can put in a car to track vehicles, it would be cheap. If you require a national infrastructure, with heavy overhead with a lot of oversight, that will be significant.

2. When will Minnesota be implementing?

Ray Starr answers:

We are in the phase of finding the concept and requirements. We are hoping to have requests for proposals (RFPs) going out this summer.

3. Question to Ed Regan, Wilbur Smith & Associates:

Would you tell Minnesota to stop? What do you tell Minnesota, who is ready to move on?

Ed Regan answers:

I'll say move on and don't wait for national go-ahead.

3. With the cost being a key element here and how to get the cost down, this is certainly one of the biggest challenges that the Dutch are facing right now and they are procuring the first national vehicle miles traveled (VMT) fee approach. I've been sorry we don't have someone from there talking about where they are on their process. One of the ways of reducing those costs is to spread the cost to various consumer applications. How do we rapidly diversify the base of applications that are attractive to customers so as to

adopt this technology voluntarily, while our governance structures are stumbling over each other to come up with a consensus approach?

Scott Andrews answers:

We have to understand this historically. The first critical cost issue is communications. If you have to pay a carrier for communication, at some point it becomes a sizable percentage of the overall system operating costs. That was part of the motivation to go with the dedicated short-range communications (DSRC) solution. We built a completely generalized communication and processing system in the car and then a very generalized, almost Internet-like, network. The whole idea of that was we didn't want to build a single purpose communication and computing system with only one application. We ended up testing five or six different applications. If you have the ability, in the car, to run a whole bunch of different applications, the cost associated with this is spread over a variety of different benefits, and each individual can choose what to have in the car.

Jon Kuhl replies:

If there is a profit to be made, then the private sector will find out how to make it. Would it be more cost effective to use DSRC infrastructure that is already present or use cellular structure? The cellular structure is already there. You don't have a capital cost. Cell providers will say, "We want a blanket contract to provide the service for 250 million vehicles, and we are going to be competitive." The opportunity to make money is there and is going to be a big competition.

I want to take the discussion just a slightly different direction. Everybody has a phone. Everybody has had a problem with it. It probably failed at one point in time. In looking at deploying systems in terms of redundancy, in terms of storage of information and uploading information, how do we account for and how do we build systems so if we do have a failure, we have this recovery mechanism?

Ray Starr replies:

In Minnesota, we read the odometer. It is to your advantage to keep it working and keep it there.

You have to account for all the weird things that people are going to do (unscrew devices, unplug, etc.) and design your systems to identify when that happens. You have to account for all the ways in which the systems are going to fail.

This is an issue we had to address in the national evaluation study. If something goes wrong with any aspect of the system, whether it is the communication, the GPS, the odometer readings, we get indications very quickly, in a few hours. It is an important problem, but it is one that you can address.

There has to be a secondary system, a secondary development, because people are smart. They are going to break it on purpose. That could mean manually reading the odometer.

I agree with the comments that technology supports policy. I think that policy makers need to be very well informed about a complete range of options that technology provides. I am worried that we may rush to some conclusions without fully understanding the potential. I also agree that there are no technology breakthroughs. However, I do think the selection of the technology choice is not trivial, and I think we owe it to ourselves to be very thoughtful about the range of capabilities and the trade offs between various technology choices. Depending on how we choose the technology, we can enable some other capabilities. We have the real ability to optimize the system and safety. As with this community, there is another community in a room, like this, somewhere else sitting around talking about establishing open interfaces into the vehicle and about doing the testing necessary to support the safety applications that will mandate the technology on the vehicle because of these safety applications. It would be a shame if we don't fully explore all those synergistic options that we have at our disposal. We are working with Jim (Whitty) to do a relatively quick study on the range of technologies available and the capabilities that they can provide so that we can inform decision makers and make an informed decision. My last comment is that I think it is good to ask what the minimum set of requirements is, but we shouldn't stop at the minimum set of requirements. We need to balance vision and pragmatism, technical feasibility with political feasibility; we may be able to sell something more together than apart.

What do you do with older vehicles? If you are planning on retrofitting, how are you going to deal with these issues? If you are not planning on retrofitting, how do you plan on collecting these fees?

First of all, you have to wait until the point where the pay off of the distribution of vehicles that are problematic to deal with becomes small. At that point we will have to make special considerations for those vehicles. Vehicles that are too old for retrofitting technology simply need to be provided with an option. Either they are exempted from the system since they are such a small portion or provide some alternative means to pay the fee.

If I was a policy maker, from the technology viewpoint, is it reasonable to assume I can make a policy decision today and begin planning the deployment of the VMT pricing system that is implemented 10 years from now, or do I need to wait for a technology to be proved? I think if you wait for the technology to be proven, you'll find there is a better technology. So I can make a comfortable policy decision today to do this, with the idea that if I decide to do it, the technology suppliers will find a way to make the system work.

I don't see any real barrier other than older cars. I don't see any specific technology barriers or any pricing barriers. There is plenty of ability to implement it today. It is just a question of deciding how.

I wonder if the best approach is for the government to design a channel and dictate it into the marketplace. A better policy decision is turn to the private sector and say, "Here is the problem I have to solve. Who can do this most efficiently, least expensively?" and allow

the private sector to come up with some pilots. Allow the private sector to come up with ideas.

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State and Local Perspectives Panel

Tuesday, April 14, 2009

STEVE SIMMONS, Moderator

Deputy Executive Director, Texas Department of Transportation

JOE CANTALUPO, Panelist

Executive Director, Capital Area Metropolitan Planning Organization (CAMPO)

REPRESENTATIVE LINDA HARPER-BROWN, Panelist

Texas House of Representatives, District 105

Member, Transportation Committee and Elections Committee

JOHN CLOUTIER, Panelist

Chair, Public Outreach Committee,

North East Texas Regional Mobility Authority

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John Cloutier

I would like to thank Trey and Ginger and the Texas Transportation Institute (TTI). They came to us through the North East Texas Regional Mobility Authority and asked us to participate in one of their studies. The study was to find out how receptive small urban and rural people would be to a user-based tax.

Today, we've heard a lot of people discuss metropolitan planning organizations (MPOs). A really important fact that came up is that 85 percent of Texas is not in an MPO. If I need to build a project where I live, I've got no MPO. I've got no direct fighting mechanisms. Once you get to the rural areas, pursuing revenues for a project is difficult because Houston outvotes us. We are 20 percent of the territorial land mass of Texas, and the connectivity in Texas is what really matters. We need to be in the game, but a large portion of who we are is not represented by an MPO. "Solving the math" is, therefore, not the only thing that concerns us. It is not a matter of do we pay or not pay enough.

I am a fairly conservative East Texan. When TTI came to us and asked us as part of a public outreach to work on their study, I ended up sitting through four sessions about the gas tax, how it is collected and how it is distributed. There's a project in my area that's been trying to get funded for 15 years. We fight for it politically. Solving the data doesn't do any good, as it doesn't give me any representation. If I don't have the politician in the right spot, I don't get my project funded. But there is a problem with the gas tax, and I was enlightened to it.

The first gas tax in Oregon was called a road user fee, and that is really important. We are very far from the principle of the gas tax being a road user fee. As consumers, as taxpayers, as constituents, we are miles away from that.

It is difficult to convince men and women on the street that there is a problem. They really don't believe there is a problem. Transportation is not a sexy issue. Their belief is that they are paying enough. Diversions here in Texas are a very large issue: "You mean 25 to 35 percent of our gas tax money is going somewhere else?" A large portion of our population is ignorant of that fact. We have to convince them that there is a problem.

We don't want the government to change the kind of car we drive. If the idea is to think that a one-size solution will fit all folks, you are barking up the wrong tree. If you expect people in East Texas to be normal, strong Texas citizens and pay into a system that is set by the legislature, and they can track what we get back out of what we pay, well then we can sell that idea. I can tell my folks, "Yes, we are going to collect the money in a different way and we are going to be able to prove to you not only what is taken but also where it goes." What I have said is to ask the next 10 constituents how much they pay into the gas tax. Most of us in this room know that they won't know. But then ask yourselves as a representative, is it okay that they don't know? It is a political game to get it back. If we are talking about principles of taxation, do they know what they pay? Do they know where it is going? And can you prove it to them?

Why would I index something for inflation that doesn't work? My sister is an attorney, and she thinks there might be an equal opportunity lawsuit in there. My community, for 15 years, has been chasing revenue for a really tiny road building project. Does the first kid that dies on that old road bring a lawsuit to the front? For us it does not much matter, all these great ideas. This thing is loaded with great ideas, but great ideas don't pass laws. Armies of people pass laws.

In politics how long do you think you have to have this discussion, to win or lose? You have 30 to 50 seconds to influence someone and educate them. You are not going to get two days of constituents' time. We spent four days with our research group, and we saw the change and the opening of minds and the understanding of the problem. You are not getting that time with the constituents to convince them of the problem.

Added-value is something we can explain in East Texas. It can be presented as local revenue production being delivered on local projects. Taxpayers and constituents will want to see the added values. You have to convince them of the problem and you have to give them an added value. And they want to pay cash. All of these systems and mechanisms that we've heard about are all high leverage and tolls. We don't have toll-viable projects. Leveraging is not the answer either. This got us in trouble in the housing market. Tell me what it is going to cost to pay cash so that we can build the road we need every 15 and 20 years. There are less of us, but we have less need as well. We just need an accurate funding mechanism.

This will force the locals to want what they can afford. The vehicle miles traveled (VMT) fee also alleviates the guesswork and eliminates the urban vs. rural conflict.

Somebody mentioned from-the-ground-up and top-down policy building. It seems very simple to me that the federal government wants to release data requirements. Ask to talk to the gas pump at a certain frequency—it's not complicated. Technology can do whatever we want.

We have a vast generational difference in my household. You really need to consider these constituencies as you decide on policy. With a one-size-fits-all approach you are destined to fail. Imagine rolling out a “grandma” unit that clips on your car and talks to the gas pump. Sons do Guitar Hero and have the ability to push many buttons, so they will not want the grandma unit. They'll want to have as many applications as they can get. There is a technological shift between generations where we can see the problems, but if we can't sell it to folks, if we can't convince them that they need the system and that they will have added value and the trust, then it is irrelevant.

Here in Texas we have the opportunity to come out revenue neutral. I see it as an end of route to those diversions. We know where those diversions are going, and those are tough. We have to find a way to get around that. Tax the wheels, not the legs folks. Tax the vehicle, not the people.

Joe Cantalupo

I think I am the only MPO person here, so I can say anything. I joined the symposium late in the morning, and what I heard was a lot about technology. So what could be the three or four things I can tell to the group that they might appreciate from an MPO guy? What would MPOs or large urban areas find appealing about mileage-based fees? I will make three or four points and stop so we can move on.

The first thing is that there might be more predictability in revenue under a VMT-based fee. Urban areas have more needs than we have revenue for. Some of this is our own fault. We took too much of an optimistic view of what things cost, and revenues haven't kept pace with what our needs are. We heard this morning some of the problems with the gas tax. To me, as a person who works in a large urban area, one of the appeals of a VMT-based fee is that it is more predictable. When we offer more predictability in the revenue, then we can plan a program, and selling those plans and programs becomes easier. I will tell you that we just started the development of our next 20-year plan. We are starting with the premise that we will lose about 50 percent of our current plan, and part of it again is because of the reasons I mentioned. Having a more predictable revenue source, whether it's more or less, will help us avoid getting into a situation where we need to get rid of half of our existing plan. We've started to have that conversation with our region, and I will tell you it was not a happy conversation. Even before we think about the new plan we started the discussion about what new needs have come up since the last plan.

The second appealing thing about a VMT-based fee is that it would help us better explain some of the inherent conflicts we've built into our plan process. Plans include programs, projects, and provisions to meet air quality standards. It occurs to me that all these things we are trying to do, such as make the environment cleaner and increase fuel efficiency, are the things that reduce the revenue gained from gas tax. I don't know what the penetration rates are for alternative fuel vehicles, and I don't know what they will be, but I do know we will have less money to maintain the system we've created. I think going to mileage-based user fees (MBUFs) helps to reconcile differences. It helps people understand it better as we are removing some of the conflict.

Another appeal is that it has the potential to get some funding down to the local level. I did a very quick analysis of our 2008-2011 Transportation Improvement Plan (TIP). One-third of the program includes local funding. More responsibility for our transportation funding will get pushed down to the states and local governments who have limited ways to raise funds for projects. Local governments have very limited ways of raising money to maintain and develop their part of the system. It might be easier for local governments to get the needed funds for projects. It begins to better connect the use of the system to what it cost to develop and maintain it.

A VMT-based fee helps us meet the challenge of explaining to people how their decisions about where they work and live affect our ability to provide transportation services. One of the things that we are struggling with now is how do you widen that argument? Our ability to provide transportation services is tied to getting them water, schools, emergency services, etc. We are trying to paint a very big picture for folks about how their decisions of how they grow and develop affect our ability to provide them with various types of infrastructure. That is hidden from people when they go to the gas pump. They don't know how much gas tax they are paying and they don't know where it goes. Moving toward a VMT fee starts to get people thinking about the money they spent on transportation. It can't hurt for us to get people to start to understand how it is all connected. Whether or not we get to a VMT fee, whether it takes 5 or 10 years, having that discussion with folks about what it means and what is bad about it will help us illustrate and teach folks how everything we do is connected.

Representative Linda-Harper Brown

We in Texas are facing a funding crisis. We just can't keep up with the infrastructure that we need and maintain what we have. We've got to look to another way. I think that the mileage-based user fee is a clear alternative to the gasoline tax. I will tell you why. We talk about toll roads all the time. Why should we charge fees plus a gas tax to build a road for our citizens to be able to increase mobility? And we talk about economic development.

Transportation isn't sexy. It does not matter if you care about health care and you think that is the most important expenditure you can have and is the most important issue on the state budget, or whether you care about education and that is the most important issue in a state budget. If we don't have mobility and we lose business to other states, then we

are not going to have the money to fund those either. It is difficult to get legislators to understand that. So how do we change that mindset?

Relate user fees to water. Everyone needs it, and they will be using it daily. Pay for it when you use it. What we do in transportation is just the opposite. We charge a tax on the gasoline. We collect that money for the last year, for the time you used it last year, and then we repair roads for tomorrow. It is not based on the need for those roads and is not based on the need to repair. But we are saying this is the only money we have of the taxes you paid last year.

What I say is that we are in a transportation drought because we are only basing it on what money we collect. If comparing to water, it is like saying we are going to impose a water tax on everyone for water you consumed last year, and once we have those revenues we are going to divide them up and this is all you will get this year even if you are dying of thirst. This is a serious situation. We need to find alternatives to the way that we tax.

I'll use my district of Irving as an example of road maintenance issues. Every major highway in the metroplex goes through Irving. Our roads within Irving were built back in the 50s or the 60s and have not been redesigned since then. You are looking at a road that was created before we had as many vehicles or vehicles that were traveling as fast as they are now. No one seems to be paying attention to that. We need to redesign some of these roads, but we don't have the dollars to do it. It is a safety issue as well as a mobility issue.

We need to go to a fee that is more equitable to people. We all have to pay if we want to use the road. Eliminate the gas tax and move to a user fee. We justify user fees for anything all day and all night, but not for transportation. If you think about the green initiatives that are taking place around the world, whether it is for electricity or water, we all think about being green. But if you think about going to a vehicle miles traveled, people pay their gas tax and they don't realize where it is going. They don't know how much they are paying. Very few know what the gas tax is. When the gas prices go up, constituents think "it is the darn government and those taxes they are charging," but it is a set fee. They didn't go up. Gasoline went up, but it wasn't because taxes went up. People don't understand what they pay on their gasoline and how much it really costs.

If we go to a vehicle miles traveled, perhaps it would cause people to think about how many miles they really drive. I heard that about 35 percent of the people on the road during the peak hours are people who are not going to and from work. Thirty-five percent of those people are retired and could travel during other times of the day. So if you tie a vehicle miles traveled to a congestion index as well, perhaps people would start having meetings a little later on in the day, consolidating trips, keeping them in close proximity, walking to the store. With fewer vehicles traveling, then perhaps we don't need as many roads. By consolidating trips and keeping trips in a closer proximity, vehicle miles and congestion could be cut down. You can also think about air quality improvements, and if fewer vehicles are on the roads because they are watching their

mileage, perhaps we don't need as many roads and we don't have to continue taking right of way. Maybe people will start looking at transit as well.

On VMT, it might be the rural areas that wouldn't want to participate in that type of plan because of the distance they have to drive to get to a store or wherever they are going. I was really impressed that East Texas said that they wanted to do the pilot program. Their idea was that if they do drive more miles, and if you based the fee on the mileage, and then return that money to that area of the state, then they thought they could benefit more because they have more money to repair and replace the infrastructure that they need. I think this is an important component.

How do we do this? How do we judge people driving from out of state? People who don't have the technology on their vehicles? We cannot address every single issue that might come up. Let's not even use technology except what exists today. Let's make it as simple as your registration. When you go to get your car inspected, you're actually charged for the miles driven. You are charged when you register the vehicle each year anyway, without any black box or invasion of privacy whatsoever. Let's just do it on the number of miles that you traveled and see what we can do. Maybe we can do an alternative for those vehicles who want to pay a gas tax instead. Let's take simple steps first and see if people can see how easy it is and how VMT works and then try to use the technology because that is one of the most difficult issues that I faced on the legislature. People are worried about the invasion of privacy. However, if you look at everything that they track us on today—I can't even go to the grocery store and buy some groceries without being tracked. They know how to target me with their ads. They track us everywhere. They know everything we do, so why can't we use this technology to help us? To try to get people used to it, we even looked at the possibility of charging just on the registration.

One thing that would help us figure this all out is that there are many companies today that give you a card if you drive a company vehicle. You put your vehicle in and put your mileage into the pump. This is already available to people. They register their mileage accurately and keep up with how many miles the company vehicles are being driven. I understand people could cheat the system, but if you put a fee and then you have a certain type of fee that says that at the end of the year if you are more than 2000 or whatever number of miles under what you pre-paid at the gas pump using this method, then you pay a higher fee because you definitely are cheating the system. So you can keep that cash flow going. Vehicle inspections are not only at the end of the year. They are throughout the year, so this could actually charge people and the Texas Department of Transportation (TxDOT) will still have their cash flow.

There are still issues with trucks being driven from out of state, broken odometers, these types of questions that come up. We're trying to get a bill that we hope we could put in place right now that would automatically move to vehicle miles traveled, but we decided it was a little too much to undertake. We didn't see how we could move forward given these issues. So we backed off, and now we have a bill that we've actually introduced that will require TxDOT to create or establish a user fee pilot program in the state of

Texas. Now we have put a bill in to do a pilot program in the state. Texas is a large state. We have so much diversity and we have so many interstates highways and so much truck traffic due to the North American Free Trade Agreement (NAFTA). How would we get people to pay for it? What would fit us? Every state will be different. Let's see what Texas would look like. If we can get it started here I think it would not only be a research project to answer these questions we have with regards to starting a program immediately, it would also be an opportunity for educating the public and the legislators. We have a long way to go in simply educating our legislators. They have heard the complaints and are weary of this user fee, etc. So by doing a pilot program we educate all of these people. I think at the end there is a greater chance of using this as a solution. We know we can't continue charging a gas tax because of more fuel-efficient vehicles, but we also can't continue this way because of those alternative energy sources that aren't being taxed at all for the use of the roads. To me, this is a more equitable way of paying for our roads than the system we have.

Questions & Discussion

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1. I liked the way you sell the mileage user fee concept. What is the reaction to the bill? How do you see moving this forward?

Representative Harper-Brown answers:

We have this cynicism about what data will be gathered, but I can tell you that some of my strongest opponents in the past are now getting to realize that this is probably a more fair and equitable way and something more sustainable than the current practice we have. I am getting a much better response than before. The rural areas seem to have more concern than urban areas. In the rural areas their concern is that this is a way for us to charge for their heavier pickup trucks, and that we would be going to a fee where the heavier the vehicles, the more we would charge. We might have to look at commercial vehicles, but on a typical pickup, I don't think its going to do that much more damage. But what we want to do is to look at incentives for fuel-efficient vehicles, sort of a discount. They are beginning to realize that there is some benefit to VMT if the money returns to their area. We could do this without technology at all. It would be more difficult, but we could do it. We just try to keep moving. I would tell you the legislature is not the transportation session I'd hoped it would be. The whole past year has been spent on transportation issues, funding, operating and also on the different issues related to transportation. This is not turning out to be the session when we address the big transportation issues. The economy downturn is the new focus. The focus is now "How do we keep people working and how do we find new jobs?" So that overshadowed this, but we are going to keep moving along, trying to get colleagues to discuss transportation and see how important it is to look at a new source of revenue.

2. A couple of the benefits include better equity, at least from the point of view of rural folks in terms of the share. What impact could this have, as there is not any less need in

the urban areas for this share. So why would they get a less share under this new funding mechanism? Secondly, another benefit that the representative mentioned was that it would perhaps cause more conservation or fewer trips, but wouldn't that create the same kind of revenue impact that the fuel economies have on the gas tax?

Representative Harper-Brown answers:

The mileage user fee may have some impact on the public. The biggest concern I have is that we are moving to alternative fuels and that we are getting away from gasoline all together. As we move away from gasoline all together, then how are we going to pay for these roads? We are not taxing the alternative-fuel vehicles. There is also the idea that the fuel-efficient vehicles on the road are doing the same damage to the road. They buy less gas and still impact the transportation system. Another idea I had was that the reason we have this is because we have more vehicles on the road, so we can move our vehicle sales tax over to transportation and we would have a lot of money to build roads. The problem is that the downturn in the economy means less money being spent and less for transportation. We have to have a new revenue source. We can't continue to just tax gasoline and expect it to pay for the roads that we need. It is just not going to work.

Comment from the audience:

Coming back to Representative Brown regarding a need for education—I wanted to make a comment. In terms of the availability of funding though state local technical assistance programs (LTAP), I think this is a perfect example again of what these technical system programs have got in training and education. In Massachusetts we have training sessions for all elected officials, state and local, as well as professionals who need to know what is the problem and some of the solutions. What the VMT user fee means, what it doesn't mean, and so on. These programs have money, and they are looking for good ideas.

John Cloutier responds:

One of the things you mentioned, public partnerships, is one of the things I would like to mention too. In the last session we were discussing what technology can help us. The discussion about road user fees takes a beating, but who is putting together the Jim Wittys and getting them out to where they need to be? We need to be pushing the public, attending speaker's bureaus, now.

Representative Harper-Brown responds:

Did I get your second question? One of the points I want to make is that right now I see urban areas being disadvantaged. They are paying gas tax and are now paying tolls. We are paying the gas tax and now we are going to pay a toll—that is like double taxing. For me, a user fee for roads all across the state is the fairer situation, where everybody pays a little but those who drive more miles and are on the road more are going to get a bigger percentage back than those on the other side. If you need additional dollars for other areas of the state, then you need to come forward and ask for that money. We could pull from the general revenue fund. There are similar problems with hurricane rebuilding. We don't get people to understand. When we started the gas tax we didn't say, "This is the only money you could spend on roads," but that is the way it is interpreted here. If the gas tax generates enough money you get roads repaired. Right now with the problems we have,

with the hurricanes and the roads we are going to have to get repaired, why wouldn't we leave our funding in place to keep on with our transportation plan that we already have? Use our gas tax dollars for that and then say, "OK, if you need additional roads, if we have this emergency here, we take that out of general revenue." To me, that is what needs to happen. We've got to start thinking that general revenue money is not just for everything else but transportation.

Joe Cantalupo responds:

It is an interesting question that I haven't thought of. If we went to a mileage-based user fee, will the miles traveled in urban areas be enough to carry the maintenance of the system in those areas? It would be an interesting analysis to undertake and to see. Many will argue that most of the problem right now is on the urban areas.

Audience member responds:

From the point of view of this gentleman from East Texas, he was saying it might be a new way of dividing up the money that hasn't been thought of in the legislature.

John Cloutier responds:

My point of view is that you start from a basis of fact. If you collect these revenues and you know where they came from and who is driving where, you are starting out the conversation from a logical, factual point and then encounter an emotional urban versus rural issue. Now we need help. We are out of money, so we take that project to compete with another project in another part of the state, but at least my constituents can see it. And they can track it. And this is really the only tax revenue that I can figure out that I can't trace to that same level.

Steve Simmons responds:

I think it gets down to fair share. Houston and Dallas get more money. The urban sites get more money, but in reality nobody is getting their fair share. In order to create that understanding with the citizens, that what they are paying in they are getting back, we will never be able to get to that unless we can do something to increase it.

Audience member comments:

You are still talking about a state VMT fee that is allocated by the state to every local government in the state. That is the wrong model. The model is that there is a state VMT fee you pay for state roads and there is a local VMT fee that pays for local roads. Austin, Houston and Dallas will pay for all their service streets and all their arterials plus their share in state highways through their local fee. And it will be what it cost them to provide that service. You pay a state fee, not a local or federal fee, if you ride on a state road. You may have some situations where it is mixed, but there is no reason to think that we would still have the same allocation problems. You use the technology to solve the problems.

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Stakeholder Perspectives Panel

Wednesday, April 15, 2009

LEE MUNNICH, Moderator

*Director, State and Local Policy Program,
Hubert H. Humphrey Institute of Public Affairs, University of Minnesota*

JACK BASSO, Panelist

*Chief Operating Officer, Business Development Officer,
American Association of State Highway and Transportation Officials (AASHTO)*

DARRIN ROTH, Panelist

Director of Highway Operations, American Trucking Association (ATA)

ANNE O'RYAN, Panelist

*Legislative and Government Affairs Manager, American Automobile Association (AAA)
Texas*

MICHAEL REPLOGLE, Panelist

Transportation Director, Environmental Defense Fund

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Jack Basso

I appreciate the opportunity to be here today. One thing that is true is that nothing focuses on financing like bankruptcy, which is what the Highway Trust Fund is experiencing today. We are running out of money. This year it's questionable whether we'll get through. The next year is completely clear: the best case scenario according to congressional budget offices is that we'd be \$4 billion in the hole and need a \$16 billion cut. We do the same numbers and look at some different variables, and we get a cut that looks more like \$20 to \$21 billion, or about 50 percent of the program. So there is no disagreement we have a big revenue shortfall in fiscal year 2010. The program is expiring. We have some interesting opportunities before us. I want to talk about vehicle miles traveled (VMT) and collection systems and things that we are doing at AASHTO.

I think we have to set the stage. I want to establish objectives for this session, the nutshell of authorization challenges. First, how much funding is needed? We have about 40 to 45 percent of the investment levels we need and have. The next question is a critical question, for what are we going to put this investment into if we had it? There are a lot of different opinions on what the investment should be put into, but I think as a general matter the agreement is that surface transportation is what is needed, and it needs to be enhanced for a lot of reasons, running from congestion reduction to climate change environmental issues to just good service to the public. One thing that is not completely clear is, "What is the federal role for the future?" How do we generate the necessary

revenue? There is good and bad news. The good news—the administration clearly gives high priority to infrastructure investment. The president took his third trip to the United States Department of Transportation (USDOT) this year, which is way more than any other president in recent history. His focus is clearly on infrastructure. I can tell you, being a member of the transition team; the focus was definitely on infrastructure investment.

The authorization process is underway. We do have excellent congressional leadership. I already mentioned the bad news is that the Highway Trust Fund (HTF) is broke. There is no support in Washington for increasing user fees and gas taxes. There are many competing goals at the national level that need to be reconciled if we are going to be successful. I'll mention some things on behalf of AASHTO. We do recognize reality, and the reality is that we need to restructure the current programs we have, and in order to do that we need to focus on preservation and renewal, expanded freight (which is a critical part of our economic activity), safety improvement programs, operations and management, congestion-reduction programs, and environmental programs including air quality and climate-change initiatives. What we proposed to do in AASHTO was to create a \$545 billion, six-year program. Now, current revenue will pay for maybe less than half of that if we had to go forward. The \$545 billion would break down to \$370 billion for highway programs to address the objectives I just mentioned, with somewhere in the neighborhood of \$93 billion for transit, perhaps a little more, and intercity passenger rail and high-speed rail getting about \$35 billion. With regard to train programs we look at a combination of things: a formula to new programs and \$40 to 42 billion for freight. We looked at those things to be important elements of what we do, and as we go forward, again the question becomes, "How do you pay for that?"

What is AASHTO's, as a stakeholder, view of what to do about that issue? We think, we have said consistently for the last two years, that in the long term a vehicle miles traveled type of billing is the future. I will tell you what has changed in these two to two and a half years is our assumption about how soon that needs to come to pass. That is the question. When we issued the report about two years ago, we thought we were dealing with something about 15 years out in terms of the practicality of making it happen. The work we did in October when we issued our policy statements concluded that we can't wait 15 years. We need to speed this up considerably and probably be ready to go in the next re-authorization. Six years from now we better know what we are going to do and do it. If you ask me, today, I say we need some interim measures of various types. One of the things we have on the way—Jim and others here are on a study panel where we are doing a very accelerated national research program about what could we be doing in the short term nationally. We are expecting to have a draft report by the end of May. That would yield some immediate information to what we could do about it. We should also credit Jim Witty and the Oregon folks for what they've done: tremendous work on these areas and having created the dialogue across the country. There is a lot of interest in the White House in this particular area, although you hear that they say no gas tax increase and no VMT, but we are going to do this program and that program.

I do think that in AASHTO, in the immediacy of things, we have three choices for financing this bill. The first is to do nothing. I gave that scenario. The programs would shrink dramatically and inflation is shrinking them everyday. The second is to do what the national infrastructure financing commission suggests, and this is an interesting group.

I think I can summarize in four ways: The first is \$545 billion for programs, what we think we need over six years. People would disagree; people would see more, see less, but it's a rational investment proposal across all the services for motorists. Secondly, we could steal money from the general fund, but there are consequences of doing that which are unforeseen, because there is no money there. Third, we think that this short-term study may yield us some information and allow us to say to Congress, "There are some things you could do on a stopgap basis that deal with VMT fees," and you need to do effective pilots in the course of this re-authorization. So when we get to the end of it we know exactly what we need to do and how we can work best. Oregon has already set the stage; the University of Iowa has work underway also. We need to go very serious and specific so that we know where we are going, and AASHTO clearly supports that.

Fourth, failure is not an option. Why should we care? Three good reasons. First, because of international competitiveness we need to be on the front end on this issue. Second is for reasons of congestion relief and quality of climate. You can reduce VMT and probably should, but it won't by itself fix what needs to be fixed. Third, simply put, our systems, for example our interstate systems, are 55 years old. We have done what people do with their houses: "I'll fix it next year." Well, it has been 20 years since we've been under-investing, and next year we have major investments we need to make in those areas.

AASHTO fully supports a VMT-type system to be able to finance in the long-term future. Secondly, the answer to questions I have gotten—the "what" is where you put the system; the "how" is how you adapt with the states, how you make it work as an integrated system; and the "why" is international competitiveness, safety, infrastructure, maintenance, systems that are integrated including passenger rail and transit. These things need to be invested in, and the national purpose of all of this is that we have a population of about 300 million people that will grow by 100 million more over the next 10 to 15 years. This is 400 million people's future.

Darrin Roth

This is an important issue for our members and for our industry. I am sure that this is the first of many. I appreciate the opportunity to be here.

I will start by repeating something we heard yesterday, which is that the fuel efficiency of passenger vehicles will improve significantly, in part because federal law mandates it. Many accept that this will then be replaced by new technologies. How long will this evolution take? Ten to thirty years? The question is whether heavy-duty trucks will convert to alternative fuels or will they get significantly more fuel efficient in the future.

We are actually going backwards on that count, actually getting less efficient. The alternative fuels are not something that manufacturers are looking at seriously (at least for long-distance trucks). Without a renewable or supplemental source of revenue for highways, heavy truck operators will pay an increasingly higher percentage of user fees. In fact, over the past 10 years heavy trucks' fuel consumption increased about 40 percent and cost consumption has gone up 6 percent, even though VMT increased by only 5 percent. It is in the trucking industry's best interest to look at other tax alternatives. The problem is not trucks. We can use diesel for a long time and we aren't going to be a detriment to the future of the highway trust fund. Is the VMT fee the best alternative? From the trucking industry perspective, particularly if the fee is imposed in trucks, there are many questions that need to be answered before we can support it.

I think we all agree that mileage fees will be more expensive to administer than the fuel tax. There are also going to be some collection issues and some evasion issues. The fuel tax has very low evasion rates, and evasion for a VMT fee will be much higher. The trucking industry has some experience in this regard. Whenever fees are imposed on individuals trucks, like weight-distance fees, etc., we have encountered a very significant evasion: up to 50 percent. You have to look at the VMT fee as basically that kind of tax. Whether or not there are technologies involved, we are talking about something that is going to be imposed on hundreds of millions of individual taxpayers.

In order to make up for lower-than-expected revenues, rates for honest taxpayers will have to be increased. Once the physical system is in place to collect satellite-based fees, any number of state or local agencies and other jurisdictions can piggyback and impose their own fees. This is especially problematic for the trucking industry. Without centralized billing, a single large truck company could potentially be faced with the prospect of maintaining accounts with hundred of jurisdictions for thousands of trucks. And there are a number of factors which the government could introduce to the fee, such as pricing based on time of day, geographic location, traffic conditions and vehicle equipment. If multiple jurisdictions adjust the fee according to these factors, it would be impossible for trucking companies to calculate their cost for a particular route. The cost could be influenced by thousands of different factors, some of which will actually change on route. So how can carriers estimate the cost to a customer for delivery, not knowing, within reasonable range, what the cost would be? This is a significant challenge for carriers.

There is the possibility of charging trucks based on actual registered weight so as to recover cost of infrastructure. There are systems available which could measure vehicle weight and theoretically adjust fees accordingly. Keep in mind this technology has system costs, and increases the opportunity for evasion and malfunction, and adds a complicated factor to what it is already a complicated system.

Congestion pricing is sort of the killer application of the satellite-based mileage fees. If all you want to do is to collect money, there are a lot less expensive, simpler, and less evasive ways to do that. I think congestion pricing will be a pretty significant part of the pricing, at least in terms of congestion, so this is an important consideration. I understand

the theory behind pricing: if you charge high enough you can reduce demand. The question is, “What is the price necessary to affect change and congestion?” Different studies say different things. Twenty cents per mile is what the USDOT study says is the rate which impacts demand. The average per car is 20 cents per mile, and this comes out to an equivalent of \$4.44 per gallon in fuel tax for the average passenger vehicle. I am guessing there is not going to be a lot of enthusiasm by Congress or any elected body to endorse that kind of increase. I think we have to be very careful when doing cost benefit analysis on VMT fees. We need to consider whether we should be including pricing and congestion reduction in that cost benefit analysis. It is a major assumption that we will actually be able to set a high enough rate to affect congestion.

Another concern is, “Would the revenue generated by a VMT fee actually be used for transportation?” It is going to be very tempting for a state to look at this and say, “This would be a great way to balance my budget.” That is a major concern.

The effect of mileage fees on federal preemption—the federal government has some control over the state’s ability to restrict the routes on which trucks can operate and on state requirements with regards to the truck equipment. It will be very difficult to have a viable, in-state trucking industry without these controls. But by charging a high fee for traveling on certain roads or having certain equipment on the truck, governments could effectively usurp federal preemption. This is a major concern for us.

Similar issues involve discriminatory pricing. Tracking vehicles with global positioning system (GPS) would allow governments to determine the origin and destination of vehicles on specific routes. This would allow these governments to identify segments with a high percentage of travelers with an origin and destination outside the boundaries of their jurisdictions. The government agencies can then increase rates on these segments, thus generating income from drivers with little or no political influence within that jurisdiction.

As you can tell, ATA is very concerned about the implications of mileage-based fees for our industry. We continue to believe that the fuel tax is the best source of revenue for highway funding. We are open to considering alternatives. We are not really sure yet what we are going to encounter once we get there. We need to take a step back, consider all of these issues, determine whether they can be resolved, and determine whether VMT fees are really the way to go in terms of replacing the fuel tax.

Thank you very much.

Anne O’Ryan

How are we going to finance transportation? Can we move ahead and really break free of some of the stranglehold that we have faced with just trying to move ahead at all? With increasing taxes, what are they going to be used for? It is complicated. And on top of that, as everyone knows, we have had such economic problems nationally. So when we have looked at some of these issues, and all of us in this room have agreed that the

transportation needs are very high and the Highway Fund is going broke, this is a critical, crucial place right now. A lot of the general public doesn't have the same focus as we do. A lot of the focus out there is jobs because people are losing their jobs. We are at this crucial place, a place in time with crisis and opportunity, in transportation, in the economy, in the world where the US stature is. There are so many things on the plate to consider: getting transportation folks in front of the country, in front of Americans, so that they understand that this is crucial, so that we don't need another bridge collapse for people to really focus on this and realize that it is an important issue.

AAA nationally has done some surveys. It is kind of interesting to look at that to see where they place things. Transportation needs were not number one; economy was right up there as number one. I do agree with a lot of what we have heard so far this morning. But I want to share some of the things that we found with some of the polling. Actually, like many things, nobody wants to pay more taxes. Everybody wants everything for free, but, unfortunately, it doesn't work that way. What we found was what people are least opposed to and what they most agree to as far as different types of taxation. It seems that what people are least opposed to in the polling we have done—tolling new constructions, using tolling for purposes that people can see, that are going to add benefit to them, that are something in addition to what they already have. We also saw, when we look at the other side, what they most supported would be increasing gas taxes, second to new construction tolling. One of the things that they least supported, and probably least understand, is VMT. A lot of people don't really understand it. I think that a lot of people have not really heard enough about it yet. There has to be a massive education program, a really sincere education program that talks about what the needs are, what is realistic out there and whether or not, when we look at VMT tax, this is a replacement tax. Is it going to be essentially to construct and maintain the roads, to maintain some of our greater transportation systems, or is it going to go forward? Should it go further? These are discussions that we really need to have with the American public out there. Is it going to be used to reduce congestion? Should it be used for pollution?

One of the things the late chairman of the Texas Transportation Commission, Chairman Ric Williamson, started talking about—and I found it very interesting to see this kind of discussion begin in Texas—was the idea of the pollution tax for driving through the city of Austin, for example, if you are taking I-35. It is probably one of the busiest roadways for trucking in the whole state. Should the region be able to tax for that burden on air quality? What is fair? That is certainly a huge discussion issue that has to be initiated with the general public about what is fair for the general public.

We've all heard the saying that perception is reality. The same is true about how the tax is currently being spent. Do they see how their dollars are being spent and trust how it is being spent? We have diversion problems in the Highway Trust Fund even though it is set up for transportation. It all depends on how far you stretch the definition of what is related to transportation. But once again, is there trust that the money brought in will actually be used for the purposes intended? I think the bottom line is that people need to be able to be brought along with some of these changes. They really need to see that there is some kind of incentive, benefit, and that they still have choices. Choices are the

foundation to the American way. Whether we live in new houses in suburbs or downtown, these are all choices which give us our American Dream. Looking at how they do things in Europe versus how they do things here—are things being done in Europe really transferable to the US? It seems like the American Dream has been built on individualism rather than looking at things as a society, as whether or not something benefits society. What we are talking about doing with VMT taxes, and possibly using them for congestion control and pollution mitigation, is really something that has to do with societal benefit. How will we get there? This is an individualism kind of dream we have here in the U.S., it's not necessarily about what is good for society. We need to start immediately with reaching out to the public, beginning those discussions. Don't expect them to come into us; we need to go to them. The Trans Texas Corridor advisory committee is an example. There had been a lot of discussion internally but not nearly enough discussion about how that would benefit the driving public. The information vacuum meant that many misconceptions got out there, a lot of conspiracy theories. It seems more important that we move ahead and fill that vacuum as quickly as possible and as many different ways as we can.

AAA agrees that given what is going on, given the hybrid vehicles, the technology, we will need to move away from what we have today. For the last 20 to 30 years there has been significant disinvestment in highways, in transportation. There should have been increases in our gas taxes all along. We need to work on the long-term track as moving ahead with VMT. How are we going to form it? How is it going to be shaped and defined? And also in the short term, move ahead with increasing the gas tax. In the session in the capitol, we have been talking about indexing the gas tax. Political will is not always there to increase the gas tax in every session. Increase the gas tax to at least try to keep up with some of the needs we have out there. AAA wants to work with all of you on how we move forward. We think that there are very important policy decisions that need to be made. Talk to our members about VMT, about alternatives that are out there, given the technology changing and the need to find other ways to support our transportation system, and our multi-modal transportation system as well. Thank you.

Michael Replegle

Some of you will be wondering why someone from an environmental group is in a conference of VMT fees. Frankly, it's because it is a growing environmental imperative that we look at how to better manage our transportation, improving mobility while reducing the environmental footprint of the system. The only way to do that is to get better operational control of the system, and VMT fees better measure, monitor and value how we operate our transportation system, specifically our roads, in real time, so that we can 1) deliver better service to the customer, and 2) manage our loads in the network. If we managed our roads the way we manage our electrical utilities, we'd have brown-outs and complete power failures in many places a couple times a day. We don't accept that from our electrical companies, and we shouldn't accept that in the 21st century from our road operators. But we still do today because the public doesn't understand that it has to put up with traffic congestion as a chronic and growing problem of their daily lives. It interferes with their daily lives, it interferes with what they get to do, interferes with the

dependability of the services they get, indeed blocks them from having access to choices and opportunities.

Back to the environmental imperative. If you look at climate change there are no longer any serious debates about global warming. The pace that the change is occurring is happening much faster than what scientists have said in their previous assessments. In terms of the melting of the Greenland ice sheets, the whole Arctic Ocean is most likely to be free of sea ice by 2035, at current rates. We don't know how exactly this is going to affect the global climate. We are likely facing the largest extinction of species. We can take action to modify our future so that our children and grandchildren do enjoy a viable planet to live on. We need to take action in the next five years to begin to slow the rate of carbon dioxide (CO₂) emissions. VMT fees are going to be a key tool that the transportation sector will use to help respond to the greenhouse challenge. This is something we also need to help make the US more economically competitive to restore our leadership. Singapore can be a model; they are competing successfully with us for some of the brightest minds in biotechnology, in part because their transportation system works so well and ours doesn't work nearly as well as it used to. They have congestion pricing and time-varying charges. There are over 70 charging points across the cities, arterial or motor way networks. Charges vary based on what it takes to keep the traffic free flowing at least 85 percent of the time. In fact, there is a large public debate that goes on in the press about how the city transportation policy and development plans operate. There is responsiveness of the government to public opinion. We need to learn more from Singapore as well as Stockholm and Germany. They offer ways to manage transportation too. Better choices and better performance must come with road user charges. The public is rightfully skeptical that new road user charges will simply be a new tax and that they won't get anything more for their money.

Frankly, the American Dream has hit the wall. The time to consider this new paradigm approach of how we manage and operate transportation is quite urgent. Time-distance-place-based road user charging can be terrific for the environment if it used to manage demand, to expand choices, and if the fee is based on the initial rates of the fuel efficiency of the vehicle. VMT has dropped 5 percent nationally due to fuel prices and now the soft economy, and also some demographic forces that have been occurring in the background. That 5 percent drop in VMT has led to a 20 percent or more reduction in delay in many corridors. There is a telematics firm that shows in 300,000 locations how the delay has changed. This also increases the greenhouse gas efficiency of our road networks by minimizing fuel consumption and also while managing traffic. If we use VMT fees simply to raise more money, to build more roads faster, and introduce a flat rate fee, it is not going to be good for the environment. A Prius paying the same as a Hummer is not the way to go. Expanding roads at this point should be the last resort, not a first resort. We need to secure our economy, not build more roads. To what degree can we hold our transportation plans accountable to addressing greenhouse gas goals? Can we, in fact, have transportation make a proportional reduction in emissions through the four legs of the stool we talked about, increasing vehicle efficiency, reducing carbon content, greater greenhouse gas network efficiency, and reduced VMT? I think we can and we should. One of the greatest challenges and barriers for transitioning from a fuel

tax to a VMT fee, I think, is not public support in increasing the gas tax. Due to lack of trust, there is a lack of understanding of how transportation gets paid today. We have a large job to do to educate the public about how transportation is paid for and how we are managing in response to getting a payment. There is a concern over a lack of transportation choices. Polling data consistently shows that when people are asked, “Where do you want to see more transportation money spent?” they would like to see more money spent on public transportation to expand travel choices for them, for their families and communities. They see roads as something we need to pay attention to, but a minority of the public sees building new roads as a way to address traffic problems. There is a fear of being tracked by the government with this whole VMT thing. I think we need to adopt some very strong privacy laws so that the public can trust their data will be protected. We can still find ways of having voluntary consent for certain kinds of programs that depend on information about location.

There is a fear about getting hit with new taxes without better services. So what might the transition look like to VMT fees? What steps should we take next? I think we need to pursue voluntary initiatives like pay-as-you-drive insurance, pay-by-the minute parking, the safety services that come with the 911 phone call when your air bag goes off. There are a lot of things that are coming in the intelligent transportation system (ITS) telematics arena that we can use to help consumers voluntarily adopt the same technologies that will support automated tolling and time-of-day pricing. We need to be taking as much action as possible to remove the barriers to those strategies, things like getting rid of state insurance regulations. Many states have seasoning laws that require insurance providers to be in business and wait 30 years before they can write policies. These are anticompetitive measures that stand in the way of market innovations. We need to be getting more tax credits, federal tax credits for insurance companies to offer pay-as-you-drive or mileage-based policies. We need mandates for state insurance regulations to reform their rules, more evaluation of the effectiveness of pay-as-you-drive insurance, more education of consumers and companies about these benefits. And ultimately it should be made mandatory that pay-as-you-drive policies be available in all 50 states because it can help us solve environmental problems and manage transportation with fewer problems of congestion.

We also need federal pilot program funding and encouragement for rapid deployment of pay-by-the-minute parking technology and parking cash out, and strong federal promotion and funding for other travel demand management strategies. These all lay a foundation for moving towards road user charges. ITS needs new requirements to minimize greenhouse gas (GHG) emissions and new federal and state-funded pilot projects to reduce VMT. We need to create a new federal commission that creates a roadmap for the next two years for VMT standards and deployment for the next five to seven years with scalable deployment through federal pilot programs. We need multiple service providers to be at the heart of providing these services in terms of how the telecommunications are handled, how the cash management and billing is handled, and how the technology is provided. There has to be competition in the marketplace so that there is an understanding that this is not the big hand of government coming in, tracking

you, but, in fact, this is just like your cell phone, and, in fact, your cell phone company will probably be one of the service providers.

To deal with the concern of the trucking industry, I think road user charges should be passed to shippers though bills of labor so that the trucker himself doesn't pay the charge but, in fact, is transparently passed through the shipper, who can get more dependable shipment service.

In conclusion, I think we need to be working much more with our global partners like the Organization for Economic Cooperation and Development (OECD) in the European Union and places like Singapore that have a lot more experience than us in dealing with some of these questions. We should be working on learning from experience, like the procurement that is going on right now in the European Union (EU) for these services. Thanks.

Questions & Discussion

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1. Do you think the administration is interested in infrastructure for the sake of infrastructure or for the sake of the problem with the economy? Does the incoming administration have a grasp of the immediate needs of the economy or a longer view?

Jack Basso answers:

The longer view is the focus of the administration. It is also recognized that the reason for doing that was not simply to do something in the short run but also for long-term benefits. An example is the \$8.5 billion stimulus for high-speed rail, which nobody saw coming. The administration has a long view, and also there is an immediate view of crisis.

2. It is clear that we have a big problem facing us. I think Jack presented that very clearly. VMT fees are not well liked by the public, and some groups, like the trucking industry, aren't convinced that this is the way to go yet. How do we carry on a dialogue about this issue? Congress is starting to work on a bill, so it has to happen soon. What are some of the key things that need to happen?

Jack Basso answers:

The public is made up of pretty smart people. When we reduce the message to something that is logical and we lay out a benefit, particularly localized benefits, we get a lot of support. I will take issue with Michael that the polls say that people are opposed to VMT fees. They are against wasting money on things that are nonsense. Lay out the benefits of a total plan projection system, not just highways, not just transit, but a total system. Secondly, with regard to VMT and other things, what do we get for this? What is the simplicity of the system? Make it such that we do have protections of privacy. Entities know exactly where you went and when, and the timeframe you were there. This is not

news that people know where you are. Information is available—it just needs to be protected. It is not just about roads, not just about freight, not just about transit. It is about an outcome.

Darrin Roth adds:

I agree with what Jack says. I think we need to be honest about the cost. We are going to be paying more than what we pay with the fuel tax, to get the same amount of revenue. There is no way to do this without higher collection costs than we have with the fuel tax. Abuses can occur; no offense, but if we put this into the state and local hands we need to be concerned. Truckers need to be concerned. This type of system will allow for those kinds of things to go on. We need to continue this type of conversation and just be honest with the public that these are potential issues that will come up if we put this system in place.

Anne O’Ryan adds:

I agree with what Jack said. I want to make sure we are very cautious about how we approach this because perception is reality. We want to make sure what we are doing is fair because it is easy to want to target motorists and truckers for things that are other components. Truckers and other motorists need to be paying for additional use of roads. Negatives of living in a huge house far outweigh living in a more compact neighborhood but closer into downtown. How are we going to do that if we do some of these things, versus utility taxes or not? In other words, what portion of the burden of the environmental elements should be placed with motorists, and what portion should be fairly placed upon the way we live? We must be fair in how we do that. General public will sense and will be skeptical because there have been diversions, because the trust is broken, so the public will be cautious about how the money is used. We do want transparency in this. We need to be brought along as far as what they own and what they should be paying for.

Michael Replogle adds:

I think it is very important that we look at equity, sustainability, fairness, as we put together frameworks to figuring out how to pay for transportation. Part of that is the polluter pays principle, which we haven’t done a very good job implementing in the US. Europeans have done a much better job at this. If you look at the burdens placed on our communities, often times people who live near our motorways experience the most detriments and health effects. We need to be more fully accounting for those kinds of externality effects and find new ways to help minimize the external costs. The only way to do that is by putting a spotlight on those costs, understanding them in the first place and developing pricing mechanisms which encourage mitigation. If you look at the major corridors for America’s ports you find cancer and disease rates that are many times higher among the people living close to those highways compared to people living farther away. We could use creative approaches to things like container fees coming in to help remedy those problems. There is no reason why we can’t develop more performance-based funding agreements in the private and public sectors relationships. As part of getting money you have to deliver better environmental performance and better service for customers.

Bern Brush with Skymeter says:

I am a proponent of VMT pricing. Thank you, Anne. Knee-jerk reaction for auto associations is NO to VMT. We appreciate the fact that AAA sees that this is coming and that it has to be involved with this. Education has to come from an organization like that, not from the government.

John Haberman from Purdue comments:

Michael, you talked about the consequences of on-time delivery. On-time delivery is not a bad thing. Also, when you said that we might have an extinction, to lay this extinction on cars and not the environment, not on the cycle of the earth, we have to be environmentally conscious, but there is a correlation between what happened during that time period. Whatever happened then, there was still extinction. You talked about promoting the economy while at the same time shutting down the economy.

Michael Replogle answers:

I think, actually, what I am talking about is trying to build a more robust and sustainable economy that creates a lot of new jobs, through lower carbon emission development. I think there is a huge potential of creating more jobs in America, building smart highways, building smart transit systems, building smart freight systems. We are big proponents of increased investment in transportation to do just that. So we can improve mobility by reducing environmental consequences. Los Angeles had adopted a new action plan to double the number of container shipments through that corridor over the next decade and reducing pollution by half. There is no reason we can't adopt that kind of philosophy for the public managing our roads nationally. I think there is nothing wrong with just-in-time delivery, but it puts scheduling constraints on truckers. They have to travel on congested roadways during peak times, so we have to charge them more. Time charges should be put more on the shipper not the trucker. We shouldn't stick the trucker with the cost of a peak-period toll that they don't have the flexibility to adjust. As the climate change, the dinosaur extinction is largely thought by scientists to have occurred because there was a massive meteor that hit the earth and basically caused a huge global change and climate. There is evidence around the world. What is happening today is that the GHG, particularly the CO2 emissions and particularly since the 1950s, have risen very sharply. Average temperature tracks pretty closely with the CO2 emissions, but now temperatures have surpassed CO2 emissions. The evidence is pretty overwhelming that this is a human-induced change.

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