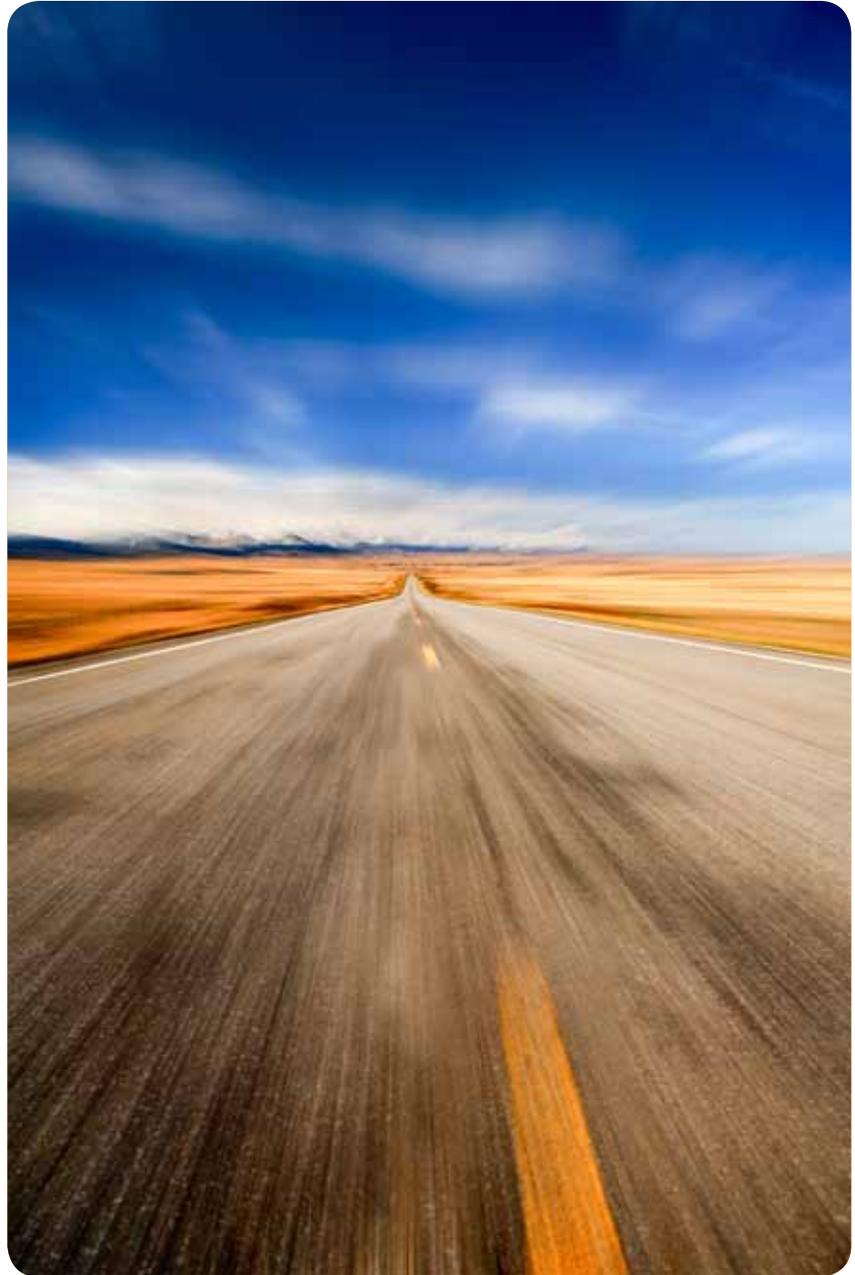




FOCUS ON

VEHICLE MILES TRAVELED FEES



A TRENDS IN AMERICA SPECIAL REPORT



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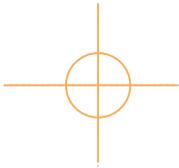


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FOCUS ON: VEHICLE MILES TRAVELED FEES

- ▶ Charging motorists on a per mile basis has gained some traction in recent years as a potential mechanism to replace or supplement state and federal fuel taxes to fund transportation improvements. Three federal bipartisan commissions recommend the U.S. move to such a system.
- ▶ Under such a system, vehicles could be outfitted with equipment capable of tracking the number of vehicle miles traveled—often referred to as VMT—in a given area. Fees could be collected based on the number of miles, and revenues could be distributed among various jurisdictions, including state governments.
- ▶ Oregon's Department of Transportation tested such a system in a yearlong pilot project beginning in 2006. Oregon officials found that paying VMT fees at the pump could work, the mileage fee could be phased in, integration with current systems could be achieved, various pricing options could be available, privacy could be protected, the system would place minimal burden on business, the potential for evasion would be minimal, and the cost of implementation and administration would be low.
- ▶ The Puget Sound Regional Council conducted its own test of a VMT system between 2005 and 2007 in the Seattle area. The University of Iowa is currently involved in a multistate VMT pilot project—cities in California, Florida, Illinois, Kansas, Maine, Maryland, Montana, New Mexico, North Carolina and Texas are all taking part.
- ▶ Distance-based user charges are already in place for trucks in Germany, Austria, Switzerland and the Czech Republic. In 2008, the Dutch Parliament approved the Dutch Mobility Plan for both passenger and freight vehicles. The program is expected to begin next year.
- ▶ Proponents like a VMT system because they believe it can provide significant revenue potential and stability, greater cost and revenue distribution equity, and greater economic efficiency, and because it would make use of proven technology such as in-vehicle GPS systems to track miles.
- ▶ Among the potential obstacles to a VMT system, according to the RAND Corporation:
 - As with gas taxes, VMT tolling is not inherently responsive to inflation.
 - It would require a significant investment of capital ranging from \$1 billion to more than \$20 billion.
 - There would need to be safeguards against evasion of VMT fees.
 - The appropriate institutional framework for implementing VMT tolling is unclear. Depending on whether VMT tolling is implemented at a state, national, regional or multi-state level, different oversight agencies and institutions may be needed.
 - VMT tolling would need to be phased-in over time.
 - Privacy advocates could find fault with it because of the potential to track the traffic patterns of drivers, and environmentalists could find fault with it because in replacing the per gallon fuel tax, it would eliminate one of the few tax-related incentives for purchasing more fuel-efficient vehicles.
- ▶ There is some disagreement as to how soon a VMT system could be implemented in the U.S.—estimates range from as little as two years up to 20 years for full implementation.
- ▶ The Transportation Research Board's National Cooperative Highway Research Program identified three promising VMT-fee mechanisms that might be pursued in the near term: mileage metering based on fuel consumption, an onboard diagnostics unit with cellular-based metering, and coarse-resolution GPS-based metering (the method used in Oregon's pilot project).
- ▶ Public acceptance must be addressed in the transition to VMT. Others key issues include: a national policy direction, state legislation to set up VMT fees, consideration of equity issues, development of system architecture and program structure, delineation of roles for the public and private sectors, and resolution of administrative issues.



VEHICLE MILES TRAVELED FEES

State and federal motor fuel taxes have been a revenue source for highway maintenance and construction in the U.S. for much of the last century. But many now believe they are on their way out. For one thing, fuel taxes are levied on a per gallon basis and with more fuel-efficient vehicles on the road—including hybrids—motorists are buying fewer gallons of gas and paying less of these taxes. While increasing fuel taxes to account for the improved fuel economy—as well as the effects of inflation—would seem a logical solution, that has proved politically difficult in many states as the recession continues and as anti-taxation sentiments grow. The result: States have been left short of the dollars needed to make necessary maintenance and improvements to the nation's transportation system.

An idea gaining traction as a future replacement for state and federal fuel taxes is charging motorists not on a per gallon basis but on a per mile basis. Vehicles would be outfitted with equipment capable of tracking the number of miles traveled in a given area (state, locality, etc.). Fees could be collected based on the number of miles and revenues could be distributed among various jurisdictions (federal, state, local).

The vehicle miles traveled—often called VMT—fee, tax or toll could potentially overcome many limitations of the fuel tax and could address other concerns for both the operation and finance of the nation's transportation system. This policy brief addresses potential drawbacks and technological, logistical and political challenges to implementing such systems, as well as the role states can play in developing the systems. It also looks at the time-frame to develop such a system and whether the public and their leaders will need convincing that VMT really is the way to go.

Oregon's Pilot Project

In April 2006, Oregon's Department of Transportation launched a yearlong pilot project to test the technological and administrative feasibility of replacing the gas tax with a fee based on miles driven in the state and collected at gas stations. The department recruited 299 motorists and two service stations in Portland for the test.

Under the Oregon concept, mileage data and fee collection both occurred at the gas pump. Vehicles were outfitted with a GPS-based receiver that identifies zones for allocation of miles driven within various predefined regions. At the fuel pump, the stored mileage totals from this device were transmitted wirelessly via short-range radio

frequency to the gas station's point-of-sale system for application of the mileage fee rates. Customers received a bill that included both the mileage fee and the fuel purchase price minus the state fuel tax—pilot participants were exempt from the state fuel tax.

In developing the pilot, the department worked with a road user fee task force created by the state legislature to maintain as many of the positive attributes of the gas tax as possible, including its ease of payment by the consumer and its ease of collection.

While working to keep the strengths of the gas tax, Oregon's experiment also sought to address its glaring weaknesses. In addition to the revenue erosion caused by increased fuel efficiency, the gas tax has another key disadvantage: There is not a direct correlation between the amount a road user pays and the burden their vehicle actually places on the road system. That burden can be different based not only on the number of miles they travel, but also on the type of vehicle, the time of day it is typically used, the area of town driven and other factors. One goal of VMT fees is to make the principle of "the user pays" more of a reality.

Following the completion of the Oregon pilot, state Department of Transportation officials declared the experiment a success. Among their findings:

- ▶ **The concept is viable.** According to the department's final report, "The pilot program showed that, using existing technology in new ways, a mileage fee could be implemented to replace the gas tax as the principal revenue source for road funding." Moreover, in a survey after the conclusion of the test, 91 percent of pilot program participants said they would agree to continue paying the mileage fee if the program was extended statewide.
- ▶ **Paying at the pump works.** The program demonstrated that the mileage fee could be paid at the pump similar to how motorists pay the gas tax.
- ▶ **The mileage fee can be phased in.** The pilot demonstrated the mileage fee could be phased in gradually alongside the gas tax. The department's report, however, points out that "retrofitting vehicles with mileage-calculating equipment appears expensive and difficult."
- ▶ **Integration with current systems can be achieved.** The pilot VMT system could be successfully integrated with the service station point-of-sale system and the current system of gas tax collection.

- ▶ **Congestion and other pricing options are available.** Fees could be charged for driving in different pricing zones at different times of day. Department officials said the mileage fee concept could support congestion pricing—where motorists are charged more to use a road during peak periods—and collection of local revenues. Using congestion pricing, the pilot program produced a 22 percent decline in driving during peak periods, according to the department’s report.
- ▶ **Privacy is protected.** The Oregon VMT system was designed with specific engineering requirements to maintain privacy while still allowing a way to audit and challenge billings. Under the system, no specific vehicle point location or trip data could be stored or transmitted, all on-vehicle device communication had to be short range, and the only data centrally stored were vehicle identification, zone mileage totals for each vehicle and the amount of fuel purchased.
- ▶ **The system would place minimal burden on business.** Administration of the VMT charge is automated and integrated easily into existing transaction processes. Distributors and gas stations would only have some new accounting burdens to deal with, Oregon officials said.
- ▶ **Potential for evasion is minimal.** In the Oregon system, tampering with the on-vehicle device would result in default payment of the gas tax. The degree to which equipment tampering would occur in other systems would most likely be determined by the eventual fee level, on-vehicle engineering, the fee structure, fuel tax rates and penalties for tampering, the Oregon department’s report concluded.
- ▶ **Cost of implementation and administration is low.** The costs would include capital costs for mileage reading equipment at service stations (development costs for the prototype station devices in Oregon were \$186 each and manufacturing costs were \$286 apiece), costs of on-vehicle equipment to be determined by auto manufacturers (development costs for the Oregon prototype device totaled \$209 per unit, manufacturing costs \$338 each, and installation \$55 per unit) and state operating costs for auditing, enforcement, administration and communication (an estimated \$1.6 million annually). Oregon’s economist estimated capital costs of \$33 million for initial setup of data transfer and service station infrastructure.¹ But, costs could become much greater depending on the level of technology used for the on-vehicle equipment and, as mentioned above,



if the decision was made to do a rapid short-term implementation of VMT that would involve retrofitting vehicles already on the road. Oregon officials did predict however that the costs of prototype equipment used in the pilot would become lower once it was in full production for statewide implementation.

The department said additional testing and development is needed to prepare for full implementation. The state would have to work with technology firms, automobile manufacturers and the fuel distribution industry to put the systems in place. Tests of multi-state systems and home fueling collections—collecting the VMT fee from those who fuel up or, in the case of hybrids and electric cars, recharge at home—would also have to take place. If those efforts were pursued, Oregon officials predicted that full implementation could occur within 10 years.¹

“It requires a long timeline to begin and fully transition because (the Oregon) model relies upon automakers to deeply embed the transponders within new vehicles,” the manager of the Oregon Department of Transportation’s Office of Innovative Partnerships and Alternative Funding, James Whitty, told a Congressional subcommittee in 2009. “The start would be at least a decade away for many reasons but primarily because automakers have a seven-year development timeline for new products.”

But Whitty said there are other ways to collect

mileage fees, other ways to create geographic zones (including accessing cellular towers), and other ways to bill motorists and accept payment that deserve consideration. Whitty asked Congress to authorize \$150 million over six years to fund additional targeted pilot projects around the country to resolve remaining issues with mileage fees. Those issues, Whitty said, include the broader concern of how VMT will be integrated into transportation finance in the U.S.

“One central issue is whether the system design should facilitate national revenue generation or allow state adoptions as well,” he told Congress. “Another is whether the mileage fee should replace the gas tax or simply augment it. How legislatures decide these issues will largely affect system design.”²

OTHER STUDIES & EXPERIMENTS WITH VMT

Puget Sound Regional Council

The Puget Sound Regional Council conducted its own pilot project from 2005 to 2007. In the study, which received support from the Federal Highway Administration and the Washington State Department of Transportation, 450 vehicles from 275 households in the greater Seattle region were equipped with onboard units featuring GPS receivers, digital roadmaps and cellular communications. Congestion charges based on prevailing congestion levels were established for each part of a tolled network of roads at different times of day. Each participant in the study was allotted a travel budget account with enough money to pay the congestion tolls for his or her expected travel patterns. The onboard units were used to record their travel and corresponding charges were subtracted from the pre-allotted travel budget. Participants were allowed to keep any remaining balance from their allocation at the end of the study. That provided incentive for them to alter their travel behavior to reduce the amount of congestion charges they incurred.

The goals of the study were somewhat different from Oregon’s. According to a summary report, the council aimed to “accurately describe the behavioral response to the congestion-based tolling of roadways, better understand issues of policy related to the implementation of road tolling, and test an integrated system of technical solutions to the problem of tolling a large network of roads without installing substantial physical hardware on the roadside.”

Among the primary conclusions from the study, the summary report offers the following:

- ▶ Observed response of drivers to tolls suggests there is a dramatic opportunity to significantly

reduce traffic congestion and raise revenues for investment.

- ▶ Not all aspects of a road network tolling system have been fully demonstrated. But the core technology for satellite-based (and whole road network) toll systems is mature and reliable. The report warns that installing in-vehicle tolling devices is a costly logistical challenge—an estimated \$665 million for installation of equipment in vehicles in the Puget Sound region alone.
- ▶ A large-scale U.S. deployment of a GPS-based road tolling program will depend on proven systems, a viable business model and public acceptance. The report warns the public might see road tolling as unfair unless they understand that directly charging users addresses existing inequalities in the transportation system and improves overall economic efficiency. Privacy concerns would have to be overcome as well, depending on what data leaves the vehicle, and what safeguards are in place to limit its availability and use.³

University of Iowa

The University of Iowa’s Public Policy Center is now testing the feasibility and public acceptance of a mileage-based charging system. It is part of a \$16.5 million study financed by the U.S. Department of Transportation—it received funding in the 2005 federal highway bill known by the acronym SAFETEA-LU—and pooled funds from 15 state departments of transportation in which onboard computers are installed in motorists’ vehicles to record charges due from road use. Unlike the Oregon study, however, no actual usage fees are collected and participants are compensated for participating in the study.⁴

The first phase of the study began in 2008 with participants in Baltimore, San Diego, Austin, the North Carolina’s Research Triangle, Boise and eastern Iowa. Last year, the cities of Albuquerque, N.M., Billings, Mont., Chicago, Miami, Portland, Maine, and Wichita, Kans., joined. Researchers are testing whether the system is user-friendly, secure, trouble-free and acceptable to drivers. They’re also looking at drivers’ attitudes about whether the onboard computers violate their privacy.

The project is expected to conclude later this year and the results will be reported to the U.S. Department of Transportation.⁵

International VMT Initiatives

Though VMT systems are only test projects in the U.S., distance-based user charges for trucks are already a reality in Germany, Austria, Switzerland and the Czech Republic.⁶

equity. VMT tolling could measure the amount of travel that occurs in different jurisdictions and the revenues could be distributed accordingly. According to RAND, that would be an improvement over the system of fuel taxes because, for example, long-haul trucks can fuel up in states with lower fuel taxes before driving through states with higher taxes.

- ▶ **It would create greater economic efficiency.** VMT tolling could be used in various ways to encourage drivers to ration or change their travel behavior.
- ▶ **It makes use of proven technology.** As mentioned earlier in this brief, VMT tolling technology including onboard computers equipped with GPS receivers, digital maps and wireless communications has been proved to work in pilot tests as well as in actual practice in Europe.⁸

POTENTIAL OBSTACLES TO A VMT SYSTEM

The RAND briefing paper also identified potential obstacles to a VMT system. Among those it identified:

- ▶ **VMT tolling is not inherently responsive to inflation.** It would be necessary to either index VMT fees from the outset to some indicator of inflation (such as the consumer price index or construction cost index) or institute periodic rate hikes through legislative action in order to account for the effects of inflation. That's the same political challenge policymakers face now with gas taxes.
- ▶ **It would require a significant investment of capital.** Onboard equipment would likely cost around \$100 per vehicle, RAND estimates. There would also need to be additional upfront investment in the information systems required to collect and distribute revenues. After that, RAND concludes, automation should yield cost-efficiencies once the initial investments are made.
- ▶ **Safeguards against VMT fee evasion are needed.** Individuals may be able to hack components of a VMT system to evade tolls and this requires careful attention.⁸ As in the Oregon pilot project, a VMT system could be engineered to result in default payment of the gas tax if an on-vehicle device is tampered with.
- ▶ **The appropriate institutional framework for implementing VMT tolling is unclear.** As indicated earlier, this framework will be determined by whether VMT tolling is implemented at a state, national, regional, or multi-state level. Different oversight agencies and institutions may be needed depending on which shape the system takes.
- ▶ **VMT tolling would need to be phased in over**

time. Although new cars could be purchased with VMT onboard equipment already installed, older cars could continue to pay traditional fuel taxes until they are retired from the fleet. That could provide a workaround for the expected high cost of retrofitting existing vehicles with VMT equipment. Such a phase-in period, RAND estimates, during which two revenue systems would need to operate in parallel, could last around 20 years.

- ▶ **Privacy advocates and environmentalists may both find fault with a VMT system.** Privacy advocates may be concerned that VMT onboard equipment could be used by government or law enforcement entities to monitor the travel patterns of individuals. Environmentalists may worry that replacing the per gallon gas tax with a flat per-mile tax would eliminate one of the few tax-related incentives for purchasing more fuel-efficient vehicles. While technical accommodations and pricing strategies can address these concerns, RAND said it will likely take some educational effort to overcome such fears as well.⁸

HOW FAR AWAY IS VMT IN THE U.S.?

While the challenges of implementing a VMT system are interesting to contemplate, it should be noted that it's not yet clear what form such a system would take or even whether the public and policymakers alike are ready to commit to it.

There is also little agreement on how soon such a system could be implemented.

At a congressional hearing in April 2009, James Oberstar, the chairman of the House Transportation and Infrastructure Committee, expressed his impatience with simply continuing to study VMT as a funding option.

"Why do we need a pilot program?" Oberstar asked. "Why don't we just phase this in? ... There are many suggestions it will take five or 10 years. I think it can be done (in) far less than that, maybe two years."⁹

Other estimates, however, range from the seven years it takes to get new equipment figured into the designs of new model cars to the 20 years the RAND Corporation's study predicts a full phased-in implementation to take.

While GPS technology and multi-function onboard computers may be the way forward for VMT tolling, there may be other simpler options worth exploring as well. A 2009 University of Minnesota report found a system drawing on existing technology could be implemented in the near future to determine the distance traveled by a vehicle and use that information as the basis for charging a road use fee. The system relies on an electronic processor and

memory that is connected to a vehicle's data bank. Such a connector has been installed in all new U.S. passenger cars since 1996. The connector, which is mounted in the dashboard under the steering column, is mainly used for engine diagnostics at repair garages and emissions control monitoring but could be used to calculate the distance a vehicle has traveled as well. A cell phone modem could then be used to transmit through text messaging the distance data to a billing office. Such a system would not require roadside data collection or new wireless infrastructure and does not depend on a GPS receiver or longitude/latitude data. The University of Minnesota researchers, however, believe it could be used as a platform to which GPS technology could later be added.¹⁰

A second report in 2009 from the Transportation Research Board's National Cooperative Highway Research Program identified and evaluated a total of nine VMT fee mechanisms that might be pursued in the near term. They included:

- ▶ **Self-reported odometer readings.** Under this scenario, drivers self-report their current mileage each year as part of the annual vehicle registration process and the state department of motor vehicles charges a corresponding mileage fee on top of the registration fee.
- ▶ **Annual odometer inspections.** Drivers submit to periodic odometer readings at certified stations run by the state department of motor vehicles or another agency as the basis for assessing the mileage fees.
- ▶ **Assumed annual mileage with optional odometer inspections.** For this option, vehicle owners are charged an annual VMT fee based on the estimated mileage for their vehicle class. Those who drive significantly less than the assumed amount could submit to annual odometer readings to qualify for a reduced fee, while those who drive more could simply choose to pay the estimated mileage charge.
- ▶ **Fuel consumption-based mileage estimates.** With this approach, fuel consumption serves as the basis for estimating travel distance. All vehicles would be equipped with an automated vehicle identifier embedded in the license plate or registration sticker. When a vehicle visits a gas station, electronic readers installed at the pump detect the vehicle ID and determine the vehicle's fuel-economy rating (and other characteristics such as weight or emissions class) based on the make and model. The expected mileage is then estimated based on the number of gallons purchased. The corresponding charge could then be added to the purchase price of the fuel.
- ▶ **Onboard diagnostics port-based mileage metering.** Under this approach, vehicles would be equipped with an onboard mileage metering device. The unit would connect to the onboard diagnostics port mentioned in the University of Minnesota report discussed earlier. Fees could be collected through the pay-at-the-pump model or the onboard unit could transmit (via cellular) mileage data to a central collections agency that would send the driver a bill for mileage fees.
- ▶ **Onboard diagnostics port/cellular-based mileage metering.** As in the previous approach, this one would rely on an onboard unit connected to the onboard diagnostics port. The onboard unit would also have built-in cellular communications that would make it possible to determine the location of travel by using cell phone towers. This scenario would make it possible to vary rates by vehicle characteristics, state or regional jurisdiction, or small geographic area. Mileage fees could also be allocated among multiple jurisdictions by using the location data. Fee collection could occur by the pay-at-the-pump model, a central billing agency or a debit card system under which fees would be deducted from pre-paid debit cards inserted into the onboard unit. This last option, the researchers say, could help alleviate privacy concerns since it would not be necessary to transmit mileage data for fees to be invoiced.
- ▶ **Coarse-resolution GPS-based mileage metering.** This is the approach used in the Oregon pilot project. It's also identical to the option above except that it would rely on a coarse-resolution GPS receiver, rather than cellular-based location, to identify the jurisdiction in which travel takes





place. A coarse resolution-GPS device, or low-resolution device, only determines the general location of travel, not the specific route.

- ▶ **High-resolution GPS-based mileage metering.** This option, similar to the one above, would rely on a GPS receiver that is more accurate (within one to two meters) in determining the specific route of travel. This method would allow greater flexibility in pricing. Per mile rates could vary by vehicle characteristics, jurisdiction, area within jurisdictions, specific route or road class and by time of day. One benefit of being able to meter by route is that special fees could apply to heavy trucks, which can cause varying degrees of wear and tear to roads depending on the engineering quality of the roads. This option also allows for congestion tolls on bridges and other road facilities without constructing new toll collection facilities.
- ▶ **Radio Frequency Identification-based tolling on a partial road network.** This approach would likely be used to augment rather than replace fuel tax revenue. As in the fourth option above, all vehicles would be equipped with automated vehicle identifiers featuring radio frequency identification, or RFID, tags. These would communicate, via short-range communication with gantries (metal frameworks over roadways used for electronic toll collection) set up along the most heavily traveled segments of the road. In this way, tolls are charged based on the facility a vehicle uses—either flat fees or tolls varying

by time and location. Since it is likely expensive to install gantries everywhere, this approach would not support tolling across the entire road network, according to researchers.¹¹

In evaluating the nine options above, researchers sought to divide the list into the least promising options and the most promising options. They based their judgments on several criteria:

- ▶ The system should be capable of metering for VMT across the entire road network.
- ▶ Any system that offers only limited metering capabilities should also be low cost. Otherwise the per-mile fees would need to be much higher than existing fuel taxes to simply maintain existing revenue levels (while also funding the new VMT system). Conversely, if a system is costly, it should also provide flexible metering capabilities to allow for additional forms of pricing, including varying the rate by time and location. That would make it possible to increase total revenue without significantly increasing the base per-mile rate.
- ▶ The system should allow for enforcement to protect against revenue loss and avoid resentment from law-abiding citizens.
- ▶ A national VMT system should allow for state participation in cases where states can levy their own VMT fees, but it should not require excessive effort for states not interested in this policy.
- ▶ The system should create a minimal burden on users. A significant increase in the burden for drivers will make the process of gaining public acceptance for VMT fees even more difficult than it is expected to be.¹¹

Among the least promising options, researchers found while **self-reported odometer readings** are the least expensive option, they could be too difficult to enforce. **Annual odometer readings** require significant effort among states, have high ongoing operational costs, increase the burden on users, and offer limited metering flexibility. **Assumed annual mileage with optional odometer readings** also requires significant participation by states and provides minimal pricing flexibility. **Onboard diagnostics unit-based mileage metering** is roughly comparable in expense to the version with built-in cellular communications but has much less flexibility in metering capabilities. The high-resolution GPS-based mileage metering requires more expensive equipment than the low-resolution version and its ability to determine specific routes of travel would primarily be most useful for weight-distance truck tolls. The additional capabilities are not required for a general-purpose VMT system. **The RFID-based tolling on a partial road network** was ruled out because it would not be possible to meter mileage across the entire road network.¹¹

As for the most promising options, researchers said **mileage metering based on fuel consumption** would likely prove the least expensive approach to develop and operate. **Onboard diagnostics unit/cellular-based metering** could provide significant metering flexibility at lower cost than GPS. Finally, the **coarse-resolution GPS-based metering** provides flexible metering options and the technology was demonstrated in Oregon's pilot project. Researchers said this is a particularly promising option if the price of the equipment is reduced through large-scale production, and if current privacy concerns associated with the use of GPS are overcome.¹¹

Price is one of the key obstacles shared by all the promising options, according to the report. Any of the three options would be more expensive—and potentially much more expensive—than collecting fuel taxes. Some estimate the costs could go as high as \$20 billion or more for full implementation. The researchers also said moving the point of collection from a relatively small number of entities (fuel wholesalers) to a much larger number (retail fuel stations, individual motorists) would make it more difficult to prevent tax evasion. All three options also entail greater administrative complexity, including new tax collection channels, a new national agency, expanded state powers, cooperation from entities not currently involved with fuel tax collection (cellular providers, retail fuel stations), support from the Internal Revenue Service, national technology specifications and certification, and state legislation.¹¹

Some, however, criticized the National Cooperative Highway Research Program report for what they consider both some notable omissions and some unfair dismissals of worthy options.

"The report is incompetent because it ignores the experience and expertise of the toll industry which collects about \$6 billion a year electronically from onboard units (transponders) in some 25 million vehicles and which has decades of experience in all facets of direct road user charges," Peter Samuel of Toll Roads News wrote last October.

Samuel also wrote the report is unprofessional because it fails to mention video tolling and automatic license plate recognition as potential approaches to VMT. That's despite the fact that road pricing in London is based on these approaches and they play "an important secondary role in scores of toll and pricing projects."

The report, Samuel also wrote, is too quick to dismiss the practicality of RFID-based tolling on a partial road network for the reasons that it could not cover the entire road network and that the cost of the readers and gantries would be too high.

"Why must the entire road network be covered?"

Samuel asked. "Why collect charges on local streets and collectors? Developers built those roads and city/county property taxes maintain them. The VMT traveled on them is small anyway."

Furthermore, Samuel wrote, while the National Cooperative Highway Research Program report's three most promising VMT options would require expensive on board units (\$25 to \$100 each in 200 million vehicles for a total of \$5 billion to \$20 billion), the toll industry's RFID-based onboard units now go for below \$2 each (or around \$300 million to \$400 million for 200 million vehicles). Readers would cost around \$3,000 each with a cost to cover the country's interstates and arterials of around \$600 million. Readers on rural and urban collector roads would add another \$525 million, Samuel estimates.

"RFID is about a billion without coverage of collectors and \$1.5 billion covering the collectors as well," Samuel wrote. "And that's with proven technology that is in use and has high accuracy. Versus... three half-baked, ill-defined schemes with lightly tested technologies that run into a cost range of \$6 billion to maybe \$20 billion plus."¹²

THE PATH TO IMPLEMENTATION

National Support

Before the finer points of the technology and policy options are debated, it is necessary for those in Washington, D.C., to agree that VMT is the path the country wants to follow for future transportation finance. Many hope the next federal transportation authorization bill will at least set things in motion toward a goal of implementing a VMT system some years in the future by providing additional funding for pilot projects and research and development. But a number of factors delayed congressional consideration of the bill—including competing legislative priorities and political concerns about potentially raising gas taxes as a temporary solution while VMT options are explored.

It is clear, however, VMT is being considered seriously as the revenue mechanism of the future at the federal level and a large number of states are interested in getting in on the action as well. Three nonpartisan commissions, including two created by Congress, have all weighed-in in favor of VMT over the last two years.

In its final report one of the commissions, the National Surface Transportation Infrastructure Financing Commission, offered the following assessment:

"Direct user charges in the form of mileage-based user charges are the most viable and sustainable long-term 'user pay' option for

the federal government to raise adequate and appropriate revenues to provide the federal share of funding for the system. Both real-world examples and academic research demonstrate that VMT fee systems have the capacity not only to raise needed revenues but also to provide additional benefits, including more efficient use of transportation infrastructure, reduced environmental and social externalities, and ancillary benefits to users in the form of information for drivers.”¹³

The other commission created by Congress, the National Surface Transportation Policy and Revenue Study Commission, recommended in its 2007 report that “the next surface transportation authorization act require a major national study to develop the specific mechanisms and strategies for transitioning to an alternative to the fuel tax to fund surface transportation programs.”¹⁴

Finally, the Bipartisan Policy Center’s National Transportation Policy Project, which is made up of former policymakers from both parties, offered the following in a report last year:

“Transitioning to a performance-based surface transportation system that is better equipped to address 21st century challenges requires a timely and evidence-based transition to user-pay funding mechanisms. This means we should begin methodically researching, testing, evaluating and resolving the various issues that are likely to arise in the course of such a transition.”¹⁵

The Implementation Process

So what does the road ahead look like for VMT? Two officials from Oregon’s Department of Transportation offered some thoughts on shaping the implementation process in an October 2009 report. They recommend that policy, not technology, guide the eventual system design and policymakers not become too attached to specific technology choices.

“A complete transition from fuel taxes to mileage charges may take many years,” according to the report. “In that time, appropriate technologies will evolve and improved systems will emerge. Closed systems may not be able to adjust effectively. Open systems on the other hand, can embrace change and foster innovation.”

The authors believe by defining minimum system and technology certification requirements at the national level, the system could have enough flexibility to allow it to evolve. That flexibility could allow states to play an active role in experimenting with various systems to determine what works best.

“The federal government can provide uniformity of technology and systems choices as well as po-

litical heft for imposing a new system on national industries,” according to the report. “The federal government, however, should continue to cede a healthy opportunity for innovation to the states.”

The Oregon Department of Transportation report estimates the transition to a VMT system could take more than a decade but the timetable could be shorter if a combination of policy and technology incentive mechanisms encourages drivers to voluntarily adopt a new system earlier.

The report’s authors said policymakers, researchers and system designers need to undertake an extensive developmental program to enable the adoption and implementation of a VMT system. Mileage charge collection models need to be compared. Commercial entities need to conduct research into technology and subsystems. And researchers need to examine the potential impact on societies and societal systems.

The authors recommend seven state-run but federally funded and directed pilot programs for testing various mileage charging systems, subsystems and system elements. If funded, these may provide plenty of opportunities for states to get involved in shaping a future VMT system.

Public Acceptance & Unresolved Issues

But the authors also weigh in on what may be one of the most important X-factors in determining if VMT succeeds—how to achieve public acceptance of such a system. They suggest three steps for policymakers:

Step One: Ensure the public understands the problem the mileage fee system is designed to address.

Step Two: Ensure the design of the mileage fee collection system takes into account public sensibilities.

Step Three: Introduce an actual mileage charge proposal complete with privacy protections, cost projections, system impacts and a specific rate structure.¹⁶

The National Cooperative Highway Research Program report detailed earlier said public education and outreach strategies to gain acceptance of VMT should begin at an even more basic level.

“There is little public understanding of the current challenges in transportation finance and in turn the motivations for a transition to VMT fees,” according to the researchers.¹¹

A November 2009 report from the Texas Transportation Institute at Texas A&M University also highlights public acceptance of VMT fees as a key issue, highlighting both privacy concerns and establishing the need for the switch to VMT as central to gaining support.

“Unless the public (and elected public officials for that matter) believe that existing remedies for addressing problems with transportation financing have been adequately used, it is unlikely that new pricing policies will receive much public or political support,” according to the Texas Transportation Institute report.

The report attempts to draw applicable lessons from the national experiences with the International Fuel Tax Agreement and the Real ID Act and apply them to the VMT transition. It lists the following broad themes that need to be addressed as the development of a VMT system proceeds:

- ▶ **The need for a national policy direction**—While states like Oregon already began the process of developing implementation plans, federal direction is needed in the area of technology standards to prevent a hodgepodge of systems that won’t operate with each other. Also, if the Real ID program is any gauge, states may need federal assistance with administrative development.
- ▶ **The need for state legislation**—Some states may require special legislation to set up mileage-based user fees as a revenue source to fund transportation. Under Texas law, for example, the only revenues specifically dedicated to transportation are fuel tax revenues. All other types of state revenues must go into the state’s general fund and then are apportioned to various state programs.
- ▶ **Equity considerations**—According to Texas Transportation Institute researchers, the public is generally unaware of how much it pays at any given time in fuel taxes since those taxes are simply tacked on to the price of gas at the pump, and they might view a different, more transparent system like VMT as an added fee, regardless of whether they are actually paying the same amount. “Implementing pricing on facilities that have been previously regarded as ‘free’ will require extensive work on the part of policy makers in terms of public outreach,” the report said. Another equity concern is that VMT might disproportionately burden residents of remote rural areas that generally make long-distance trips. It is important that a mileage fee be structured such that the rate varies based on whether travel is occurring in urban or rural areas, according to the report. Finally, some owners of more fuel-efficient and environmentally friendly vehicles, who are now paying less in fuel taxes, may feel they are being unfairly punished by the imposition of a fee system that equalizes user costs across all vehicle classes. One workaround might be to structure fees where the drivers of these vehicles receive a discount on their mileage fees, the report said.
- ▶ **System architecture**—The three main issues with regard to VMT system architecture that will need to be resolved include: the information collected on consumer activity; the ability to audit to assure fees are properly calculated, drivers are charged appropriately and evasion is minimized; and the capabilities of the on-vehicle devices to collect and transmit data.
- ▶ **Program structure**—The report lists three major implementation issues with regard to program structure: whether user participation is required or optional, whether the rollout is immediate or phased in over time, and whether systems should operate as stand-alones or whether they should cover multiple jurisdictions and be interoperable.
- ▶ **Potential public and private sector roles**—The report ponders whether there is a role for the private sector not only in VMT technology development, but also in system oversight, operations such as collection of the user charges, administrative duties and overall system development. It will clearly be important to enlist the auto manufacturing industry as a partner in equipping vehicles with onboard devices as well.
- ▶ **Administration issues**—The transition to a mileage-based user fee system would require the development of an administrative apparatus capable of collecting and processing payments from millions of drivers, which could prove challenging. The report’s authors wrote that



policy makers should focus on four aspects of fee payment: the method by which fees are assessed, the method by which fees are collected, data aggregation, and the burden of responsibility for payment (determined by such factors as whether a driver pays the VMT fee at the pump or is required to mail in their payment).¹⁷

CONCLUSION

States are already playing an important role in helping to resolve many of these issues, taking part in VMT pilot projects around the country. They will likely continue to do so.

The first state to conduct one of those projects, Oregon, now wants to undertake a new pilot that would allow motorists to choose the capabilities of the onboard transponders in their cars. An open technology platform would allow them to select different levels of privacy protection and different services including traffic incident reporting, real-time traffic speed data, travel route time and parking availability. Oregon officials believe offering such choices and keeping the technology options open may lead not only to greater public acceptance, but also a shorter adoption timeline, coverage of all types of vehicles and the ability to evolve as technology does.²

Many around the country will be watching such projects with great interest as the nation searches for a revenue mechanism that can replace or supplement the one that built the highway system over the last century. One day, every mile traveled could bring the country one step closer to a 21st century transportation system.

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