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The Decline of Fuel Taxes and New Transportation Funding Options

By

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Executive Summary

Fuel taxes originated in the early 1900s to address the problem of a growing roadway system without an adequate means to fund this system. These taxes created the concept of the "user-fee," meaning that those who use roadways should pay for them. In addition, the predictability of the tax helped plan for and grow the roadways system. However, a variety of forces now place this system in peril.

Raising fuel taxes has become toxic politically, causing inflation to eat away at the purchasing power of the tax. With no increase since 1993, the tax has lost over a third of its purchasing power over that time. Additionally, Corporate Average Fuel Economy (CAFE) standards are rising, meaning vehicles are more fuel efficient, which is positive in one regard, but ultimately results in less revenue per mile driven. Finally, the uncertainty of petroleum imports and the growth of alternative fuel vehicles indicate a new funding structure is needed.

The literature covers several options to supplant the existing system: income taxes, sales taxes, public-private partnerships, vehicle miles traveled (VMT) taxes, and high occupancy tolls (HOT). Of the options, the most preferred was VMT in conjunction with HOT. Sales taxes were also considered a viable option.

To address the preferences of transportation professionals and their constituents, a survey covering these options was created. From the responses, it was clear that the status quo of fuel taxes will be difficult to overcome. Both groups preferred fuel taxes as the first option to fund transportation over the next 30 years. VMT was the second option preferred by professionals, but was only the fourth option chosen by the general public. Additionally, the survey highlighted that technology and implementation issues are a hurdle that must be overcome for VMT and HOT to be successful.

Literature Review

History of the Fuel Tax

"A national policy requiring reduction in the use of fossil fuels and a fuel-tax based system of transportation finance are inherently in conflict" (Wachs 2006, 7). This quote succinctly describes one of many challenges facing funding for surface transportation in the United States. While other topics currently dominate the political landscape, the fuel tax, which is presently the primary funding source for roadways, is beginning its decline into insufficiency. An alternative funding structure will be needed to replace it, but opinions vary greatly about the proper way to fund transportation, who should pay, and how these funds should be collected. The current options will be analyzed to determine their strengths, weaknesses, and overall likelihood of providing a suitable replacement income for the fuel tax. However, before solutions are probed, it is important to understand the history of transportation funding, why fuel taxes have been in use for so long, and the multitude of forces driving down their effectiveness.

As Martin Wachs describes in his 2006 testimony before the Texas Study Commission on Transportation Finance, roadway systems were generally localized to urban areas and built to handle very light traffic in the early 1900s (Wachs 2006, 2). As the personal automobile came into use, the new volume of vehicles quickly strained the abilities of local roadway systems and demanded a response. The federal government eventually assisted states with funding grants to build regional roads to connect cities, improving the national roadway network. Over time, the concept of tolling motorists to pay for roads came into effect. While this development seems unremarkable today, it created the idea that the user of a roadway should pay for the roadway, also known as "user-fees," a methodology for roadway funding that persists into the 21st century

(Wachs 2006, 2). This topic will be explored in detail later. While tolling is a common way to fund roadways today, it was inefficient in its infancy. Although today's tolling methods are sophisticated, with electronic toll tags and automated toll booths and billing, tolling originally required a massive amount of overhead, including constructing toll booths and paying toll collectors, as well as the obvious requirement that vehicles stop to pay tolls. Toll evasion was a rampant problem as well, placing additional strain on tolling systems (Wachs 2006, 2).

In 1918, the state of Oregon discovered a new way to continue requiring user-fees for roadways while eschewing tolls: installing a tax of fuel consumed by vehicles. Wachs notes that because "fuel taxes cost much less to collect and administer than tolls, …they soon became the principal means of financing America's main roads" (Wachs 2006, 2). A 2006 report by the Transportation Research Board (TRB) provides a different perspective, arguing that fuel taxes were seen as a source of stable revenue and the user-fee correlation was coincidental. The report comments the "user fee-based highway finance system was not created with this efficiency consideration in mind, but rather because it was seen as a stable and equitable mechanism for raising a desired level of revenues" (The Fuel Tax 2006, 40). Regardless of the original intent, fuel taxes expanded on the paradigm shift introduced by tolling by creating a system that effectively correlated vehicle usage to tax collected, all while driving down collection costs.

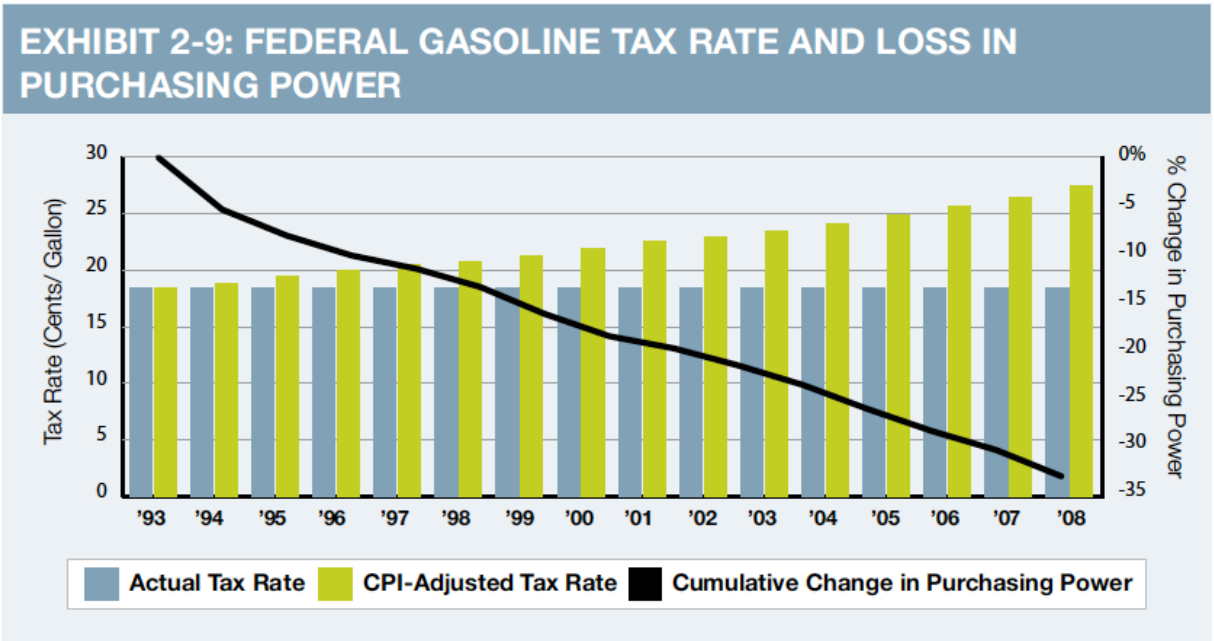
In 1932, a federal gas tax of 1 cent was introduced (Tax Foundation, 2012). However, unlike state fuel taxes, which were earmarked for road projects, the federal gas tax was credited to the federal government's general fund, where congressional lawmakers could divert this revenue as desired and not necessarily pour it back into the roadway system. Ironically, during this time federal law mandated state fuel taxes do just that. This dichotomy was eliminated in 1956 with the advent of the Highway Trust Fund (HTF) and the introduction of the plan to build

an interstate network of roads, at which point the federal gas tax was 3 cents per gallon, and the average state tax was 5.7 cents per gallon (Wachs 2006, 4). The creation of the HTF was the solidification of the opinion that roadways should be paid for by the people who use them. All federal fuel taxes went into the HTF, and all spending out of the HTF went back into roadways. By law, the fund had to maintain a positive balance, meaning expenditures could not exceed revenues. Federal and state fuel taxes have continued to grow since this point. In 2012, the federal fuel tax is currently at 18.4 cents where it has remained since 1993, while the average state rate is about 30.5 cents per gallon (American Petroleum Institute, 2012).

Why Fuel Taxes Are in Decline

Although this funding structure has been self-sufficient for over 50 years, multiple forces have started to dismantle its effectiveness for funding the maintenance and improvement of roads. Fuel taxes are a flat price, not a percentage of fuel price, nor are they indexed to inflation. The major jumps in the federal fuel tax came in 1983, from 4 cents to 9 cents, in 1990 from 9 cents to 14.1 cents, and in 1993, from 14.1 cents to 18.4 cents. Although the fuel tax was a much larger share of total fuel price in the past, as Wachs notes, "most legislators do not wish to incur the wrath of their constituents by even discussing possible increases in the motor fuel tax rate while the pump price of gasoline is fluctuating between $2.50 and $3.50 per gallon" (Wachs 2006, 6). With almost 20 years since the last increase, and no change in sight, the purchasing power of fuel taxes has waned. A 2009 report prepared for Congress notes "because it is not adjusted for inflation, the federal gas tax has experienced a cumulative loss in purchasing power of 33 percent since 1993" (Paying Our Way 2009, 2). The exhibit below from the same report shows that if the federal fuel tax was tied to the consumer price index since 1993, it would be 27.5 cents per gallon, with the 2012 rate being almost 30 cents per gallon. A similar analysis on

state fuel taxes shows that their purchasing power has declined almost 20 percent in a similar time span (Institute of Taxation and Economic Policy, 2012). There is a large discrepancy between when states last raised their fuel tax, with 20 states not raising it over the past 15 years and 22 states having raised it in the past 5 years. Conservative states tend to fall into the former



Source: FHWA 2006 Highway Statistics, Table FE-21B, indexed using CPI-U as reported by the Bureau of Labor Statistics.

category, whereas liberal states are generally in the latter. The general anti-tax sentiment that currently exists, especially towards fuel taxes, prompts an almost unanimous response from the literature that this method of financing is past its prime. The National Surface Transportation Policy and Revenue Study Commission (NSTPRC) comments in their 2008 report titled "Transportation for Tomorrow" that "the fuel-tax-based revenue mechanisms probably cannot be relied upon" (Transportation for Tomorrow 2008, 4). Another government source, "Paying Our Way" states, "there's a growing recognition that we need to begin to move to new approaches for financing…The pay-as-you-go user fee that we've had in place since 1956 is not really up to the task" (Paying Our Way 2009, 55). While the latter report argues revenue needs could be met

within the existing financing structure without an unprecedented tax increase, it recognizes this is currently very unpopular with the general populace and therefore politicians. "Paying Our Way" comments that "at a minimum, there is great uncertainty about the level of HTF funding that could be sustained by current-law tax rates and revenue sources over the next 20-30 years" (Paying Our Way 2009, 45).

While inflation is partially to blame, Corporate Average Fuel Economy (CAFE) standards are also responsible for endangering the fuel tax, as described in the opening quote of this section. CAFE standards are federal requirements for the fuel economy of vehicle fleets from manufacturers. When addressing how CAFE standards will affect fuel prices, the literature echoes a common concern that revenue per mile must be maintained for fuel taxes to be viable. Simply stated, if a vehicle's fuel efficiency increases, the amount of tax collected per gallon of fuel has to increase. Under current standards, cars and light trucks must have an average fuel economy of 34.1 mpg by 2016, at which point there are no additional increases currently mandated (Fuel Economy Standards 2012, 1). In 2002, the TRB report recommended raising federal plus state fuel taxes 10 cents per gallon (in 2012 dollars) to offset these planned standards. However, these levels are not set in stone and more stringent standards are in the works. A 2012 report from the Congressional Budget Office (CBO) details how revenue from fuel taxes would be affected by stricter rules. These new standards would increase the fuel economy mandate to 49.6 mpg by 2025 (Fuel Economy Standards 2012, 1). To offset this particular increase, the study recommends an increase in the federal gasoline tax of 5 cents per gallon (in 2012 dollars).

Although reasonable projections may need to be made for planning purposes, CAFE standards moving forward will be driven by petroleum prices, of which projections are difficult

at best. An article from a July 2010 issue of the Institute of Transportation Engineers cites a U.S. Energy Administration Report estimating $3.20 per gallon in 2025 in 2012 dollars (Barker 2012, 47). The TRB created an estimate of $1.90 - $3.20 per gallon in 2025 in 2012 dollars (The Fuel Tax 2006, 98). Other estimates exist, but the myriad of assumptions made in these estimates make it difficult to accurately compare estimates or even analyze the feasibility of individual assumptions. That being said, from a reading of the literature it is clear there is uncertainty in these projections. If fuel prices remain stagnant, the expected demand from the public for super-efficient vehicles will likely be mild, with drivers favoring spacious, less fuel efficient vehicles. If for some reason petroleum imports drop precipitously, and the price of fuel doubles or triples (adjusting for inflation), the demand for efficient vehicles (and strict CAFE standards) will be swift and aggressive. Under the first scenario, revenues will suffer without a tax increase, but under the second, the effect could be catastrophic to the HTF. Compounded with the inflationary risk, the variability of petroleum prices and production has many transportation professionals seriously concerned. CAFE standards are of course closely linked to the desire of some of the U.S. populace to reduce the total amount of carbon emitted by vehicles. However, some drivers are looking to reduce their vehicle's "carbon footprint" completely.

Over the past decade, the phrase "going green" has entered into the public's vernacular. While this phase is held in contempt by some and embraced by others, there nevertheless is a clear movement to be better stewards of the environment. Since the transportation sector was responsible for 23 percent of U.S. carbon dioxide emissions in 2007, it is a prime offender (Barker 2012, 49). When it comes to vehicles, this means decreasing or eliminating carbon emissions through vehicles not entirely dependent on an internal combustion engine. Electric/gas hybrids are one type, such as the Chevy Volt, while other types are exclusively

electric vehicles, such as the Nissan Leaf. While the cost savings through increased fuel efficiency does not offset the higher price of these vehicles, they are still a growing percentage of total vehicles sold. A study by the University of California in 2007 focuses on what drove consumer choice when it came to fuel economy. Interestingly enough, it found drivers "bought hybrids mainly for ideological reasons, and not to save money" (Turrentine, Kurani and Heffner 2007, 18). While it may be tempting to dismiss the viability of alternative fuel vehicles in the market based on financial factors, as the survey points out, it must be understood "decisions about fuel economy [are] governed more by emotions than by analysis; more by its meaning than by its monetary value." To further close the cost gap, federal and state governments are creating incentives to improve the payback period for these vehicles. Federal tax credits have been passed into law, and as Wachs notes, "state programs [allow] hybrid vehicles carrying a single occupant to use high-occupancy vehicle (HOV) lanes" (Wachs 2006, 6). Ultimately, buying a hybrid or electric vehicle can be a social or political statement, especially among those who want their vehicle to reflect their environmental views.

This subtle shift has not gone unnoticed in the transportation community. In a 2010 issue, the *ITE Journal* laments, "Shifts to more efficient vehicles and alternative fuels only make the outlook for the gasoline tax bleaker" (Barker 2012, 51). State Departments of Transportation (DOTs) are concerned as well. The 2006 TRB report states that "among the foremost state concerns …is that energy supply, environmental constraints, or changes in automotive technology will reduce fuel consumption, with reduced revenues as the consequence" (The Fuel Tax 2006, 13). While this could be offset by new revenue, "the implicit assumption behind this fear is that fuel tax rates will not be raised to compensate" (The Fuel Tax 2006, 13). In conjunction with rising CAFE standards, alternative fuel vehicles impose more risk on the fuel

tax, hollowing out a previously reliable revenue system. With a herculean effort needed to raise this tax, especially at the federal level, this revenue stream is being attacked on multiple fronts. One estimate is that total revenue to the HTF could plummet by 20 percent by 2025, a sizable drop in such a short amount of time, which would be devastating to the roadway system (Infrastructure 2010, 45).

Though the complexity of the fuel tax makes it an arduous task, some of the literature has attempted to analyze tax shortfalls and estimate what changes need to be made to support the HTF in the near future. "Paying Our Way" recommends an increase of 25-27 cents per gallon just to maintain the roadway system (Paying Our Way 2009, 70). This estimate does not even include costs to improve this same system, which will continue to be needed as long as the U.S. experiences population growth and corresponding increases in vehicle miles traveled. "Transportation for Tomorrow" recommends a raise of 25-40 cents per gallon, phased over 5 years, with the gas tax also being indexed to the construction cost index, to help the tax avoid declining purchasing power for increased raw material costs (Transportation for Tomorrow 2006, 8). "The Fuel Tax" suggests the ideal federal plus state gas tax should be $1 per gallon to accurately reflect roadway maintenance and congestion costs (The Fuel Tax 2006, 85). As discussed earlier, given the hesitation of lawmakers to consider even a 5 cent increase, these recommendations seem unlikely to be included in a bill that has any chance of passing.

As shown by the literature, the future of the fuel tax is an uncertain one due to a variety of issues. With no index to inflation and with no increase in the last 19 years, its purchasing power has diminished. CAFE standards follow in a similar vein, accomplishing the goal of reducing vehicles' carbon emissions, but ultimately resulting in more miles traveled per fuel revenue, increasing wear and tear on roadways, and neglecting to properly pay for this damage.

The future projections of petroleum prices show little expected stability. Based on these projections, it appears reasonable the public's demand for more fuel efficient vehicles will continue to climb, further decreasing fuel tax revenues. The bottom line is that oil is a finite resource that will eventually have to be replaced. Currently, there is not much urgency to do so, but the manufacture and sale of alternative fuel vehicles are on the rise. As technology improves and becomes cheaper, these vehicles may become more cost effective options for a larger part of the automobile purchasing public.

An analysis of the literature on the issues of alternative fuel vehicles, CAFE standards, inflation and the politics behind tax increases, show the fuel tax is in decline. An alternative must be found to supplant it as it wanes. The consequence of failing to do so is a roadway system that is dangerously underfunded, putting the maintenance and construction of roads in a precarious situation, ultimately risking the ease of mobility in the United States.

Public Private Partnerships

Many options have been floated as a possibility of replacing fuels taxes, and the literature covers many of them in great detail. One potential solution is the increase of private-public partnerships, also known as PPPs. These arrangements introduce "innovative finance techniques that allow infrastructure projects to move forward while keeping taxes low" (Buxbaum 2007, 1). The driving force behind these partnerships is the idea that the private sector, in its quest for a profit, can creatively find more efficient ways to operate roadways than its public counterpart. A theme throughout much of the literature is that private equity is a substantial untapped resource that could fund transportation. "Transportation for Tomorrow" comments, "public-private partnerships, can serve as a means of attracting additional private investment to the surface transportation system" (Transportation for Tomorrow 2006, 8).

A PPP is a very broad definition that can cover many different types of relationships between the public entities that own roadway "assets" and their private partners (also known as concessionaires). These agreements usually include some or all of the parts of the following structure: design-build-finance-operate-maintain. In a design-build project, such as the kcICON bridge project, which rebuilt a bridge over the Missouri River in Kansas City and was completed in 2011, a contractor teamed with one or several design firms, who then submitted a proposal to the "owner" (typically the government agency in charge of the roadway). The owner then selected the project team based on the best proposal. In this example, while the Missouri Department of Transportation (the owner) had a list of goals to accomplish, the project teams were given more latitude to creatively meet those goals within a set budget. This approach differs from the traditional design-bid-build process. In this scenario, the owner hires a design firm, who creates design plans based on the owner's desires for the project. The owner then submits the design to contractors for bids, with the low bid usually winning the work for qualified bidders. The design firm and contractor only communicate through an intermediary, the owner, in design-bid-build. In design-build, communication between the designer and contractor is critical, and occurs very frequently. While design-bid-build asks, "how much will you charge me to build this?", design-build asks, "how much can you build me within this budget?"

Another type of PPP focuses more on the finance, operation, and maintenance of roadways. In this case, the private partner pays the public partner a large upfront fee, either directly, or as a benefit to taxpayers by building a new roadway or upgrading an existing one. In return for this service, the public partner has a right to collect on their investment, usually in the form of tolling or some other revenue collection type over a period of time. After the terms of

the lease have ended, the asset returns to the public partner. The private entity may be responsible for maintenance of the roadway, or not, depending on the terms of the contract. One of the first PPPs was the "SR-91 Express Lane" project in California, in which private funds built a 10-mile private road with express lanes. The investor recovered their equity through variable time of day pricing (congestion pricing), a topic which will be discussed in more detail later. Leasing toll roads came onto the scene in 2004, when the Chicago Skyway was leased to private investors for 99 years for $1.8 billion (Buxbaum 2007, 1). Shortly afterwards, Indiana leased its toll road that connected to the Chicago Skyway for $3.8 billion, allowing it to fully fund its long-term transportation plan (Buxbaum 2007, 1). As one piece of the literature comments on this controversial issue, "many observers hailed this as the long-awaited silver bullet to solve chronic shortfalls in transportation funding," while others "decried (it) as a short sighted sale of American infrastructure" (Buxbaum 2007, 1).

After an examination of the literature, it is clear PPPs have had mixed results. In a January 2012 CBO report, the SR-91 Express Lanes project is described as the most financially successful. Projected revenues were initially realized, but the project contract also had a "non-compete" clause with the public partner, the Orange County Transportation Authority (OCTA). As congestion skyrocketed in California, the Transportation Authority wanted to build more lanes to accommodate growing volumes of traffic. This upset the concessionaire, as their tolled lanes would have difficulty competing against toll-free lanes. The ultimate outcome was that the OCTA bought back the express lanes from the private partner so they could add capacity of the roadway. The private partner sold the road for a $61 million profit (inflation-adjusted dollars), not including the toll cash flows it received by operating the lanes from 1995 to 2003 (CBO PPPs 2012, 15). While this project is considered a success, others have not fared as well. The

South Bay Expressway in San Diego and Camino Columbia Bypass lanes in Texas were also built in a PPP relationship. When actual traffic volumes (and toll collections) were only 50 percent of expected volumes, these projects rapidly experienced financial strain, ultimately forcing the companies behind them into bankruptcy (CBO PPPs 2012, 15). As a result of these and similar projects, no roads have been built exclusively with private funds in the United States since 2002.

While trumpeting the benefits of PPPs, the literature also tempers any expectations these could be a far-reaching solution for funding problems. "PPPs are only part of the solution and cannot overcome systematic underinvestment in infrastructure…(and) not all projects are good candidates for a PPP," notes one industry journal (Bailey-Campbell 2011, 8). In contrast to shorter blurbs that highlight the wonders PPPs can perform, many larger studies correctly point out private equity is not a "new" revenue source. This funding structure is most similar to bonding, where government entities receive a large amount of money in the present to tackle one or several projects, and then service the bond debt over a period of time. Of course this ultimately results in a project costing more than it would have without debt due to interest payments on the bonds. "The Fuel Tax" cautions PPPs "should be viewed as a financing mechanism, not a new source of revenue" (The Fuel Tax 2006, 67). A January 2012 CBO report succinctly echoes this sentiment: "private financing will increase the availability of funds for highway construction only in cases in which states or localities have chosen to restrict their spending by imposing legal constraints or budgetary limits on themselves." In cases where a government entity cannot or will not bring a tax increase before voters, the novel structure of PPPs may allow for what is effectively a tax increase, while avoiding funding roadblocks that

may currently be in place. It was also noted that private investors may have an easier time increasing tolls as "market pricing," an argument scarcely heard from government entities.

While the literature clearly favors the use of PPPs, it does so less than some groups outside the transportation funding industry who prefer limited government, and view PPPs as a means to bring that philosophy into the building and maintenance of roads. However, the literature points out that, "Because the United States highway system has most recently been a public enterprise, people instinctively reject the idea of the private sector profiting from a toll road" (Buxbaum 2007, 1). With the trepidation of those who view the private sector with suspicion and the inevitable discussions in the public sector on what constitutes a "reasonable profit" from tolling, it seems unlikely to point to private investors pouring money into roadways in the near future. Given this stalemate, state and federal governments may start to issue tax incentives and loan guarantees to encourage private investment in the future. However, just like bonds, taxpayers ultimately bear the risk (and cost) for these incentives and guarantees. Overall, PPPs will not play the central role in funding transportation in the future.

Sales and Income Taxes

As discussed earlier, many transportation professionals favor the current financing structure of a fuel tax because it follows the "user-pays" principle: Those who use roadways should pay for them. However, for a variety of reasons much of the literature has discussed moving away from user-pays toward a broader financing structure, such as a federal or state sales tax, or even earmarking income taxes for transportation use. The income tax approach, or "ability to pay" is especially favored among those who view the current systems as regressive, requiring those with small and moderate incomes to pay as much for roadways as those with larger incomes (assuming the amount of fuel purchased is similar). This approach to fuel taxes

would closely mirror the current income tax system in the United States, where those with higher incomes pay a larger proportion of their income to support public services (Evolving Transportation Finance 2011, 41). While those with higher incomes tend to own more vehicles and drive more miles, therefore paying a greater share into the HTF, many still view this disparity as inadequate. Using income taxes to fund transportation does have a precedent. Since the HTF's expenses have eclipsed its revenues since 2008 and federal law requires the fund to maintain a positive balance, Congress has been transferring funds from the federal treasury, a treasury largely funded by income taxes. Those who want a disproportionate amount of roadway funding to come from those who pay larger amounts of income tax describe these transfers as "a paradigm shift and a great opportunity" (Freemark 2010, 11).

A portion of the literature also favors utilizing sales taxes to fund transportation. While the sales tax provides a large tax base similar to the income tax, it has a more "regressive" nature, charging the same percentage across all income levels. In the Missouri Department of Transportation's "Financial Snapshot," possible increases in sales taxes for transportation funding are prominently examined (MoDOT 2011, 8). This snapshot details one of the main drivers of a sales tax approach for transportation funding, in that a small increase in state income tax (or the creation of a federal income tax) yields a large amount of revenue when compared to a large fuel tax increase. For instance, in Missouri a 0.25% increase in general sales tax would result in around $146M of revenue, while a 3.5 cents fuel tax increase would result in $140M in revenue (MoDOT 2011, 14-15). Wachs comments, that "while the annual tax paid by households might be the same between these taxes, small increases to a frequently paid tax has proven much more palatable politically" (Wachs 2006, 15). Voters also like taxes they can control to some degree. While fuel taxes never face a referendum, sales taxes generally require

local approval and have finite lives (Wachs 2006, 15). These taxes may be passed with the promise of the construction of certain projects with the revenues. While involving taxpayers in project discussions is important and useful for determining preferences, others question sales taxes on this very basis. A fine line must be walked between involving the public in decision making and removing the authority to allocating resources from professionals. For example, a sales tax supporting a slew of new and aesthetically pleasing roadways would be more likely to pass a referendum than one promising the maintenance of existing roadways through pavement repair and overlays. While transportation professionals recognize the need for maintenance, flashy projects are a much easier public sell. This approach may not efficiently apply the limited resources available to the projects that need the money the most.

Most of the literature supports the user pays principle, underscoring paying more for driving more creates some level of efficiency in the market of transportation. "Transportation for Tomorrow" voices strong support for "the principle of user financing that has been at the core of the nation's transportation funding system for half a century" (Transportation for Tomorrow 2006, 7). In its analysis of various funding options, "Paying Our Way" paints a sales tax as a very weak option precisely because it moves away from user pays, with little regard for the amount of revenues that could be raised or the public's view of sales taxes. It argues that by removing this relationship, the incentive to restrict the amount of miles traveled will diminish, increasing congestion and leading to an inefficient roadway system. Wachs refutes this point by looking at the origin of the user-pays principle saying "that in 1920 only ten to fifteen percent of all citizens were highway users, while in 2005 almost everyone is a transportation system user. If nearly all citizens are system users, some argue that it is no longer as useful as it once was to distinguish between user fees and general fees" (Wachs 2006, 16).

While advocating the economic benefits and efficiencies that come with user pays, the literature fails to adequately address the fact most public services are not funded by user fees, but rather through general revenues such as income and sales tax. Contrary to those comments cited in the literature, there seems to be little consensus among economists that other public systems outside transportation are creating economic inefficiencies. Rather, opinions seem to fall along ideological lines. Given the varying opinions on sales taxes, they at least must be considered as a potential solution to long-term transportation funding woes. This would not be a radical shift, as six states already use general sales taxes to fund transportation, while many others employ a sales tax on fuel in addition to a per gallon fuel tax (Paying Our Way 2009, 120). Broadening the sales tax on fuel to a general sales tax may play well with the public, as it would be a smaller, more frequent tax, which the literature tends to admit is easier to sell to the public.

Vehicles Miles Traveled Taxes and High Occupancy Tolls

A final funding option appearing frequently throughout the literature is referred to as vehicles miles traveled (VMT) and is closely linked with high-occupancy tolls (HOT). A VMT tax would essentially charge vehicles per mile driven, similar to the fuel tax, but more precisely linked miles driven to mileage charges. However, a VMT tax would avoid the issues with alternative fuels and fuel-efficiency standards that have the created the need for a new system in the first place. A High Occupancy Toll system, also known as congestion pricing, has a fairly broad definition and applicable situations, but is very popular within industry professionals. A 2007 University of California report stipulates, “It is almost universally acknowledged among transportation planners that congestion pricing is the best way, and perhaps the only way, to significantly reduce urban traffic congestion” (King, Manville, and Shoup 2007, 2). This theory is based on supply and demand. With rare exceptions, using the U.S. roadway system costs the

same, whether you are driving during rush hour, or at 2 a.m. in the morning. Since roads are in much higher demand during certain periods of the day, drivers should theoretically pay more for roads during these times. Though more fuel may be burned sitting in congestion, this extra cost does not adequately make up the demand gap. Congestion pricing allows for one or more lanes of a roadway to charge motorists higher fees during certain times of the day. While a pricing scheme for these systems can be very complex, the general idea is to set a price high enough that it will fund maintenance and construction of the roadway system and encourage those who are able to seek other routes during peak hours or adjust commuting hours. This system would require a significant investment in new technology along HOT roadways, with devices able to measure when and where vehicles entered and exited the system, in order to provide proper billing.

VMT receives much praise from the literature as it allows for the continuation of the user-fee paradigm while avoiding the political pitfalls of raising fuel taxes. "Paying Our Way" highlights how a well-priced VMT tax could fulfill transportation funding needs, while closely relating vehicle use to taxes paid (Paying Our Way 2009, 7). "The Fuel Tax" has praise for both VMT and HOT pricing, saying, "Road use metering [HOT] and mileage charging [VMT] appear to be the most promising approach…within a comprehensive fee scheme that will generate revenue to cover the cost of an efficient highway program in a fair and practical manner" (The Fuel Tax 2006, 191). A third article comments "the most promising alternative revenue measure appears to be a vehicle miles traveled (VMT) fee, provided that substantial privacy and collection costs can be addressed" (Transportation for Tomorrow 2007, 8).

While congestion pricing and mileage charging show promise, the previous quote highlights a few of their pitfalls, the upmost of which is privacy. While fuel taxes are collected

from fuel manufacturers before being sold to distributors, there is no feasible way to tax vehicle manufacturers for a VMT fee. Since a tax at the source is not possible, VMT taxes would need to be collected in another manner. State and federal governments would need some way of knowing how many miles a commuter traveled since their last payment, and in the case of congestion pricing, where and when those miles were driven. This creates a myriad of privacy concerns and is a high hurdle for VMT to clear. Even with a large percentage of the population posting private details of their lives on social media, there seems to be a reaction against sharing private information if a state or federal government is collecting data for use. It will be a difficult challenge to convince drivers to allow some sort of technology to relay how much, when and where they have recently driven to a government entity. An example from the *Los Angeles Times* illustrates why great strides in communication and research are still needed, as it suggests miles traveled could be collected by "tracking devices send[ing] a signal to a GPS satellite following the car" (Wachs 2006, 11). If the public's fears about privacy are to be assuaged, better communication and private collection methods will be necessary.

In 2006, the state of Oregon instituted a VMT project to determine the pros and cons of this type of pricing (Evolving Transportation Finance 2011, 47). The state retrofitted a number of gas stations and volunteer vehicles with electronic equipment that broadcasted and received odometer data from vehicles. The project was a success and determined VMT pricing and collection was both a feasible way to collect revenue and could provide a reasonable level of privacy. However, their results also indicated there is a trade-off between privacy and dispute resolution. Databases can be built to read transmitted mileage data, to bill based on that data, and then discard the transmitted information without storing it permanently. However, if someone is billed incorrectly, it may be difficult to prove so without a database of collected

information. This remains the major obstacle to VMT, and a large public relations effort in addition to powerful database security features will be necessary to convince the public a level of privacy can be maintained with the switch to VMT.

Interestingly enough, fuel efficiency standards, one of the forces driving the gas tax out of existence, are also a barrier to a VMT tax. Fuel taxes encourage some level of efficiency, since vehicles with low miles per gallon (mpg) buy more gallons of gas per mile driven than vehicles with high mpg, and therefore pay more tax. This would not happen under a typical VMT tax, as a large SUV would pay the same amount per mile traveled as a subcompact. This would obviously remove a piece of the incentive to purchase a fuel-efficient vehicle, although the total amount of fuel purchased per mile would still be larger for a less efficient vehicle. This shift would not be a positive one for those who want to see greenhouse gasses reduced, even within the boundaries of CAFE standards. California Assemblywoman Fran Pavely expresses concerns about this issue and privacy when she noted, "people who drive fuel-efficient, less polluting cars would have exactly the same tax burdens as people driving huge gas guzzlers…Allowing the government to track Californians' movements everywhere they drive is a totally unacceptable Big Brother type-intrusion…Invading our privacy and providing a disincentive for people to drive clear-air vehicles would be a terrible U-turn in public policy" (Wachs 2006, 11).

The last major hurdle for VMT is simply that it is a change from the status quo and may be difficult to sell to voters, particularly since there would be a period when a VMT and fuel tax would both be collected, albeit in smaller amounts. Implementing a sales tax to fund transportation may take some convincing, but it is a known entity and more familiar to the general public than VMT, a fairly new concept. In order for an effective implementation, a

VMT system would need to be far reaching and affect almost every mode of vehicular transport. A 2011 CBO report states “If VMT taxes were intended to maximize or even significantly improve the efficiency of highway use, they would need to vary greatly by vehicle type, by time and place of travel, or both” (CBO Highway Trust Fund 2011, 31).

With any new concept such as VMT, a variety of interest groups will see an opportunity to influence policy. Since the VMT, like the gas tax, is regressive, there will undoubtedly be a clamor to reduce the amount of tax paid by lower income groups, which could reduce the effectiveness of congestion pricing. HOT lanes have also come under fire as “Lexus Lanes,” with visions of the rich flying by in unrestricted lanes and the poor mired in congestion. A proper VMT and HOT pricing scheme would also punish heavy vehicles such as semi-tractors. A 2011 TRB report notes “incremental damage imposed by trucks on highways is not reflected in the current taxes on truck ownership and use; as a result, “there are wide disparities in the degree to which different types of trucks pay the cost of highway damage that is associated with their use” (Evolving Transportation Finance 2011, 31). Put simply, one 10-ton truck does much more damage to the roadway than ten 1-ton vehicles. A “correct” pricing scheme addresses this issue by raising VMT and congestion pricing schedules for heavy vehicles, which would create opposition from those who drive tractor-trailers.

While there are always challenges with appeasing multiple interest groups and changing the status quo, the literature is strongly behind mileage costs and congestion pricing as the best way to correctly price transportation costs in the future. To do so, equity concerns for the poor, privacy concerns, and technology matters must be examined and solved. Only then will a comprehensive and effective plan be put in place adequately addressing both revenue and congestion issues for the nation’s roadways.

Procedure and Methodology

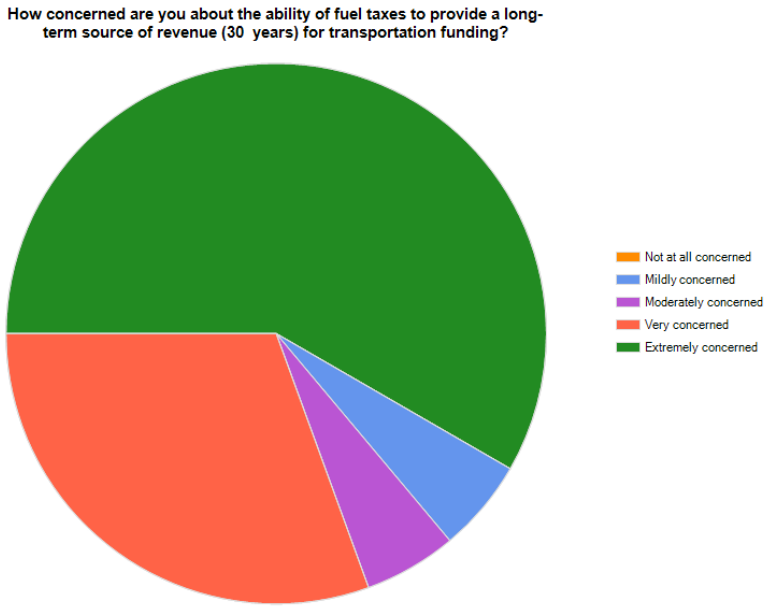
VMT taxes/congestion pricing and sales taxes dedicated to transportation funding appear to be the two options the literature supports for a long-term transportation funding solution. Many policy issues with VMT and HOT lanes must be addressed before this option is ready for implementation, as opposed to the sales tax, which is more of a known entity. Although the literature clearly favors VMT/HOT, sales taxes are viewed as a possible way to collect needed revenues as the fuel tax wanes. One of the most important problems to tackle before the implementation of a new revenue structure (especially a national one), is gaining the support of the general public. As a result, transportation professionals must know what the public knows/likes about the current options: What do they view with suspicion and what are they ready to accept? Is one option so toxic it needs to be abandoned, or at least temporarily tabled? By having this information, professionals can clear up any misconceptions, and devise a strategy to communicate with the public.

For primary research, I created a survey consisting of 23 multiple-choice questions, and sent it out to 130 Department of Transportation (DOT) officials from all 50 states. These individuals have an intimate understanding of what concerns their state has when it comes to transportation funding, and what challenges need to be addressed to transition away from the fuel tax. Questions in the survey focused on the knowledge of their constituents' views on transportation funding. Recipients were also asked their opinions on topics to confirm what was seen in the literature. Results were analyzed to identify any regional trends. The ultimate goal of this survey was to identify current views of the general public and how they coalesce with different transportation funding options.

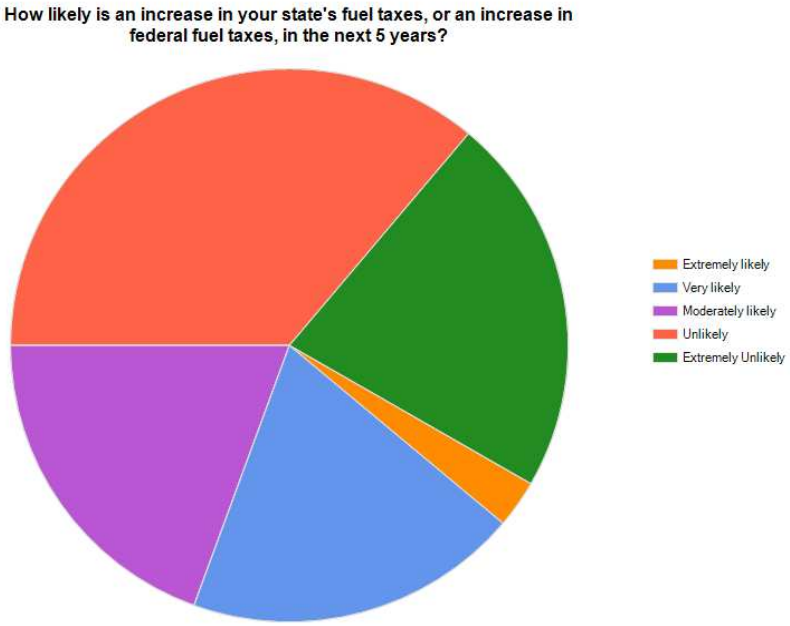
Results

The survey was sent out to 130 officials, of which 36 responded, a 28% response rate. About 60% of the respondents were from the Southeast or Midwest, while the other respondents were spread out over the Northeast, Northwest and Southwest areas of the country. The data confirmed much of what the literature had to say, but there were also somewhat contradictory responses on several questions that will be explored in detail below. The survey results made clear that a chasm remains between the view of DOT officials and their constituents, one that must be bridged to adequately fund transportation moving forward into the 21st century.

Continuing on themes from the literature, DOT officials are clearly concerned about the viability of fuel taxes. When asked about the ability of fuel taxes to provide a source of revenue over the next 30 years, 88% of respondents were "extremely concerned" or "very concerned" about its prospects. Nearly the same percentage also rated the need for a new revenue source in their state as "very high" or "high."



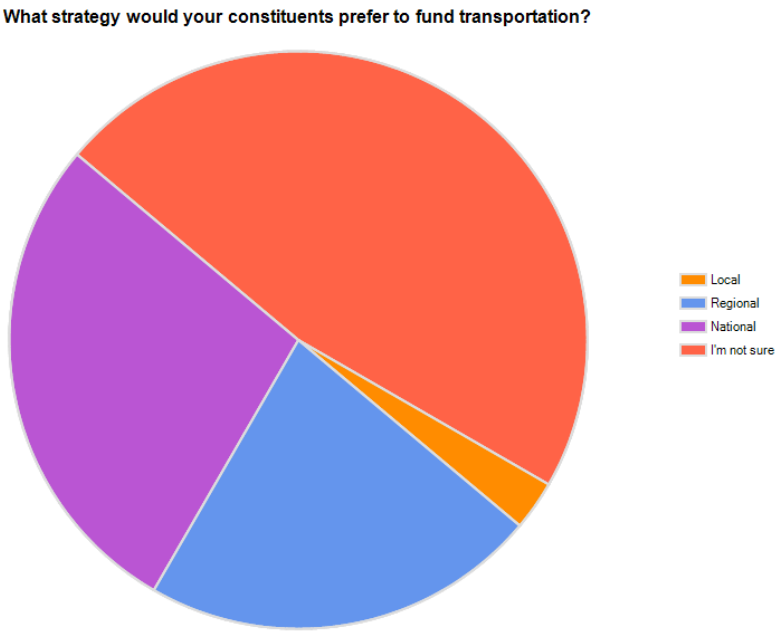
The literature review covered the erosion of the buying power of the fuel tax and the difficulties of raising it, a problem that was confirmed in the survey. Almost 60% of respondents to one question indicated that an increase in their state or federal fuel tax was "extremely unlikely," or "unlikely" to occur in the next five years.



While these answers were somewhat expected from an analysis of the literature review, the preferred method of funding over 30 years for transportation professionals offered unanticipated results. The six choices were as follows: income tax, sales tax, public-private partnerships, vehicle miles traveled tax, high occupancy tolls, and fuel tax. Respondents were asked to rank their preferences. Surprisingly, the fuel tax received a plurality of votes for the top spot, with 37% of voters preferring the fuel tax. Over 85% of respondents placed the fuel tax in one of the top 3 slots. The VMT tax followed closely behind, with 32% of votes for the top spot and 77% of votes for one of the top three options. High occupancy tolls were the next preferred, with an average rating of 3.36 out of 6. PPPs received a 3.5 rating, and sales taxes received a 4.05 rating. Income taxes had a 5.45 rating, and 73% of respondents listed this option as their

least preferred choice. While a VMT tax being near the top was consistent with the literature, it was curious why so many respondents showed little confidence in the fuel tax in one question, and yet preferred it as a 30-year funding option in another question. A regional analysis shed no light on the matter, with this dichotomy extending across 4 of the 5 regions for the survey.

Next, the survey focused on the public's view of general transportation issues. When asked about their constituents' views on the importance of transportation issues, DOT professionals provided answers that mirrored a bell curve, with 42% indicating transportation issues were a "medium" priority for their constituents. Twenty-five percent said they were a "high priority," and 17% held that they were a "low priority." This was not surprising, as transportation funding issues are currently not hot topics in the news. In another question, DOT professionals gave mixed responses to the question of what strategy their constituents would prefer to fund transportation, as shown below:



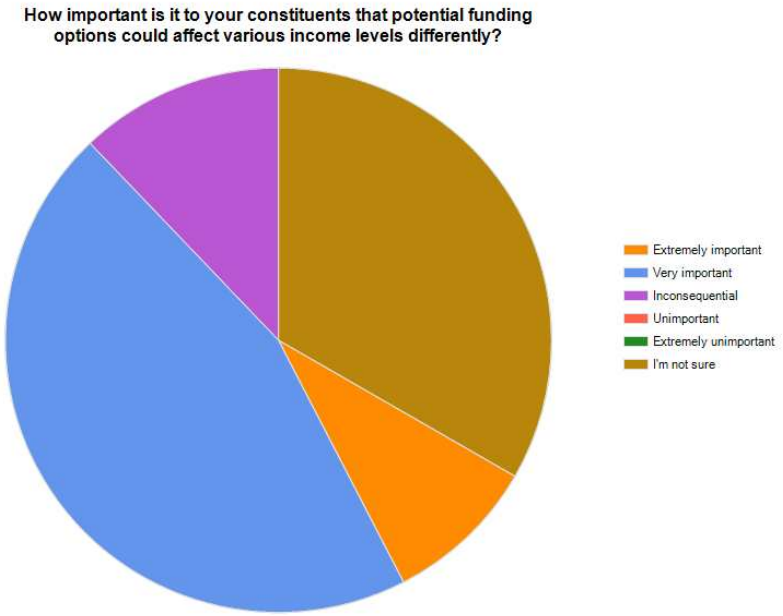
Many responded that they didn't know, while the rest gave responses that were basically split between "regional" and "national." Since the literature outlined that a national strategy would be

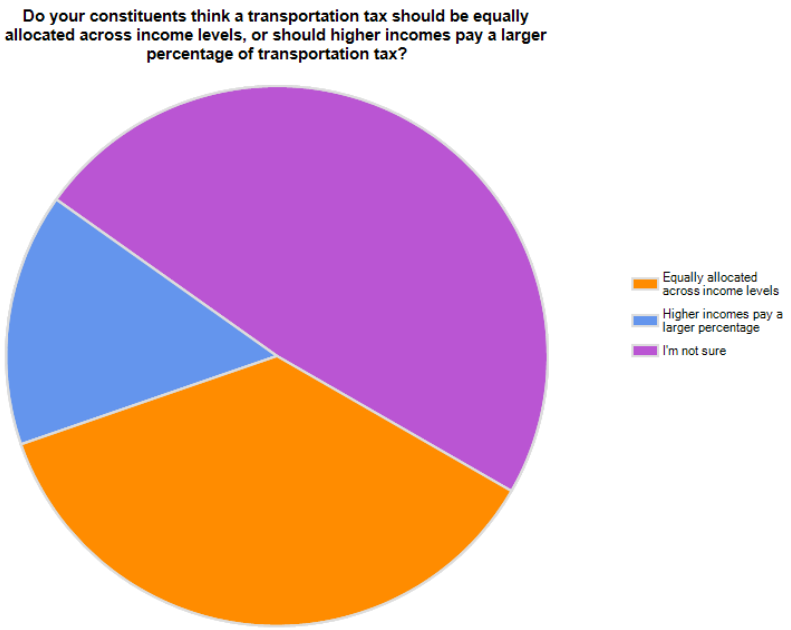
by far the most effective strategy, it was encouraging that the survey partially reflected this, especially with an anti-federal government mentality in much of the country. It was anticipated that there would be a split between the regional and national options. That being said, the 45% "I'm not sure" response needs to be addressed.

The next section of the survey moved away from discussing the state of the fuel tax into specific questions about whether respondents and their constituents supported a user fee strategy. This type of strategy is inclusive of fuel taxes, VMT taxes and HOT lanes, but excludes general sales taxes and income taxes. Since the latter options have no correlation of road use to amount of tax paid, they are not considered user fees. In harmony with the literature, 94% of responses from DOT professionals indicated they supported the concept and practice of user fees to fund transportation. However, on the next survey question, 15% of professionals responded that they were concerned about moving away from the user fees but thought income or sales taxes were the best option. Clearly these individuals did not support user fees if they thought sales or income taxes were the best option. These responses were contradictory and may need to be clarified in further research.

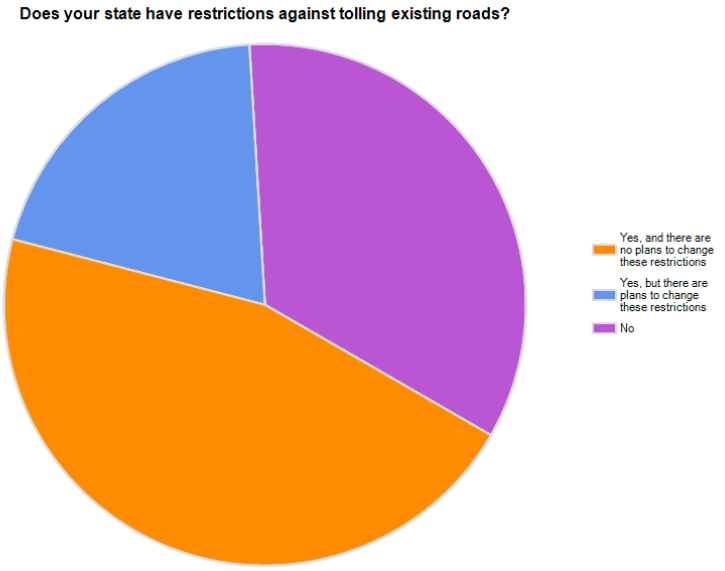
In reference to sales taxes, the question was asked if the public prefers to pay a small tax many times, or a large tax a few times. Not surprisingly, the answers were overwhelmingly in favor of a small tax many times. While raising transportation revenue from a general sales tax would spread out tax collection more than with the current fuel tax system or with tolling, it is unlikely that either would still be considered a "large" tax. There is likely a price point for what is considered large. However, since a large majority of the public seems to prefer paying small portions of tax, but still supports the fuel tax, it is clear the $4-10 in fuel tax every time you refuel would not be considered a large tax.

Responses were also ambiguous as to the public's understanding of the user fees concept. When asked how important it was to constituents that different funding options could affect various income levels differently, almost 50% of respondents said this was "very important." With another 10% saying "extremely important," and 33% answering, "I'm not sure." it is clear income equity was a concern. However, when asked a follow up question regarding the same topic, about 35% responded that the public thought transportation taxes should be "equally allocated across income levels," while only 15% thought "higher incomes [should] pay a larger percentage." The other 50% were unsure. These two questions seem to indicate that while people are concerned about how transportation taxes affect various incomes, they still do not think higher incomes should pay a larger percentage of transportation taxes than those with lower incomes. This stands in contrast with the "progressive" income tax system, where households with higher incomes pay a higher percentage of taxes. An interesting area of further research could be why the public prefers a progressive income tax system, but are more willing for transportation taxes to be spread equally across income levels.





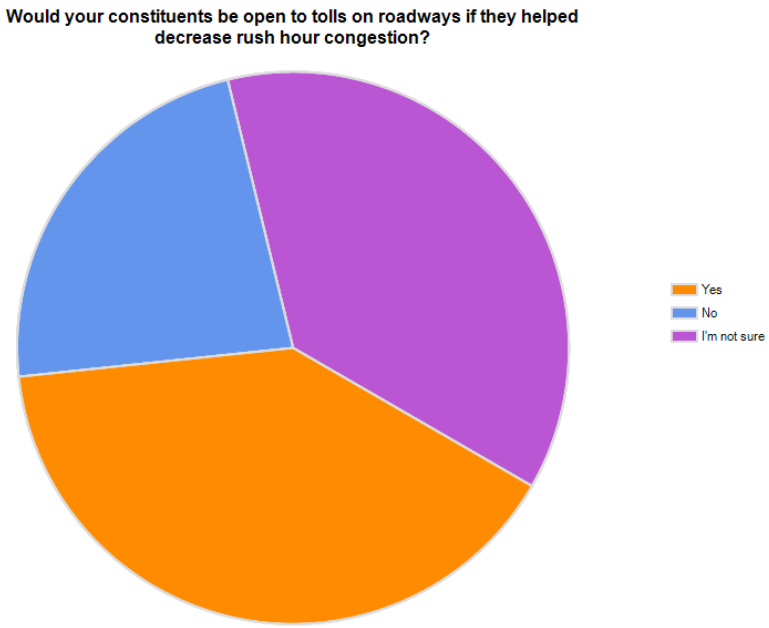
Next, the survey moved onto discussing high occupancy tolls, which revolve around tolling lanes, roadways, or areas. The first question on this topic asked professionals if their state had restrictions against tolling existing roads. Around 45% of responses indicated there were existing restrictions against tolling, and there were no plans to change these restrictions. Twenty percent had existing restrictions against tolls, but plans were in place to change these restrictions.



The fact that 65% of respondents indicated their states either do not have tolls, or may allow tolls in the future was encouraging for HOT lanes. While the ability to change state laws on tolling generally goes hand in hand with improving public perception of tolls, it is certainly preferable for tolls to be legal under the status quo.

While existing laws are somewhat favorable to tolling, the public perception is still negative. When asked how their constituents would react if roads that were currently free were tolled, even if they paid a reduced fuel tax, 55% said their constituents would oppose this change forcefully, while another 35% said their constituents would oppose this change mildly. When combined with the first question asked about tolling, this seems to indicate that while several states have the legal authority to toll, they are unlikely to do so in the immediate future due to public perception. In fact, almost all responses suggested that constituents whose states did not have legal tolling restrictions opposed tolling either forcefully or mildly.

Respondents were then asked several questions relating to problems with HOT lanes and pricing explored in the literature. The first basically asked DOT professionals if drivers in their state would prefer to reach their destination slowly, and not pay a toll, or if they would prefer to reach their destination quickly, and pay a toll. About 30% said their drivers would prefer not to pay a toll, while 50% were not sure, and 20% would pay a toll to reach their destination faster. A later survey question addressed this issue more directly when it asked if constituents would be open to tolling if it decreased rush hour congestion, as shown in the next figure.

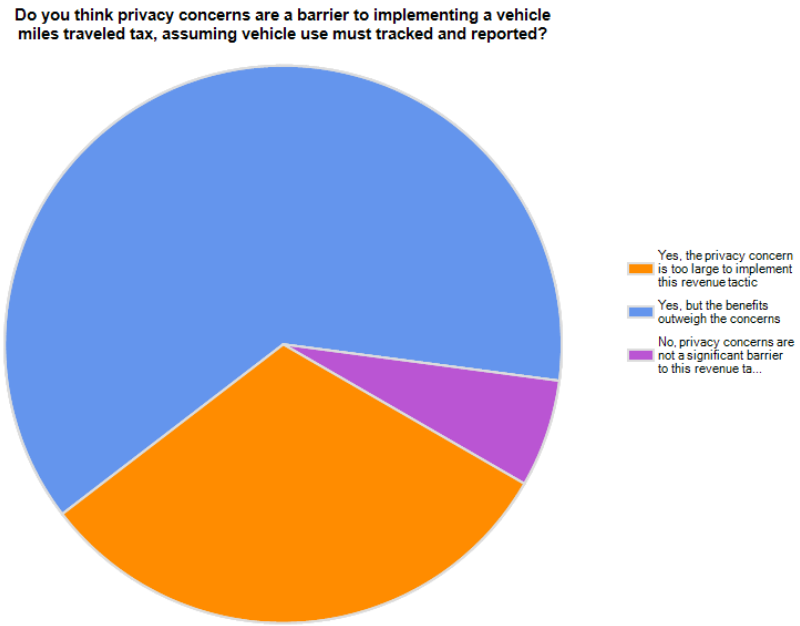


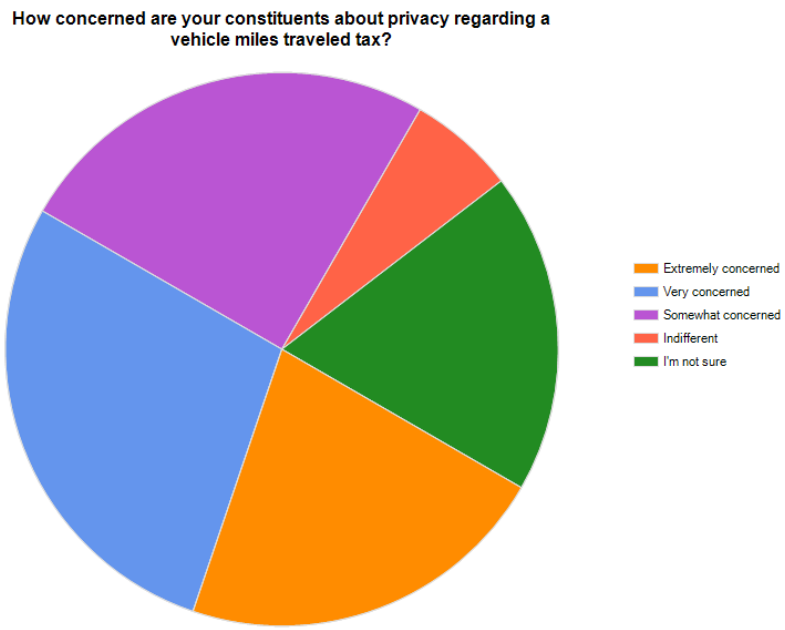
The responses suggested there were almost twice as many drivers who would pay a toll if it decreased rush hour congestion, as opposed to those who would not. This contrasted with the previous question indicating that drivers preferred to not pay a toll and reach their destination more slowly. This juxtaposition could be addressed in further research.

Another concern of the literature regarding HOT lanes is that they would be viewed as "Lexus Lanes," only accessible to those with means to pay an extra toll. While the benefits of effective road pricing were explained earlier, the survey showed these concerns are a reality. Over two thirds of respondents said their constituents would have concerns that tolled lanes were only accessible to wealthy drivers under a HOT pricing scheme. As the literature discussed, the main benefit of HOT pricing is it provides a more accurate way to price road costs, using a supply and demand model. As drivers spread their trips to other routes and times, congestion and travel times are reduced on major roadways. Unfortunately, survey results seem to indicate drivers would rather "spend" time in congestion than spend money on tolling. Along with concerns about the equity of tolled lanes, and the inherent difficulties in correctly setting road

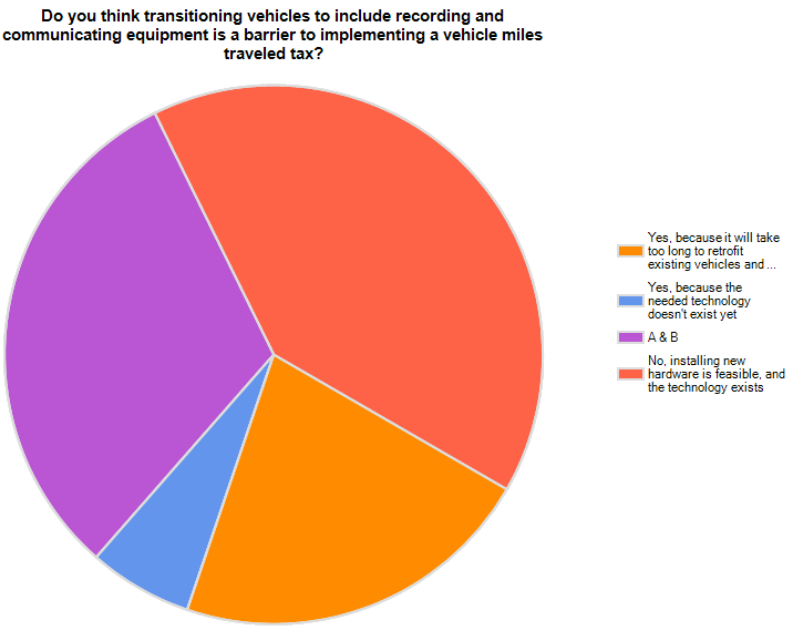
prices as explored in the literature, HOT pricing still has significant hurdles to overcome, both within the industry and among the general public. For this to be a viable national transportation strategy, an enormous amount of time and effort will be needed to communicate with the public, and other entities about the benefits of HOT pricing.

Finally, the survey covered VMT taxes. Since this option would require mileage (and possibly locales) to be collected on a regular basis, privacy concerns are at the forefront of this funding strategy. First, respondents were asked their views on this issue. As shown below, almost all answers indicated privacy was a serious concern, but a majority of respondents still thought the benefits of VMT outweighed these concerns. Few professionals thought privacy was not a significant issue. When asked what their constituents thought, the respondents indicated a greater concern for privacy. Over 50% of answers indicated that constituents were "very concerned" or "extremely concerned" about this issue. The survey did not overwhelmingly reject VMT, which is a positive, but collection methods to ensure as much privacy as possible will still need to be developed, and explained to the public.



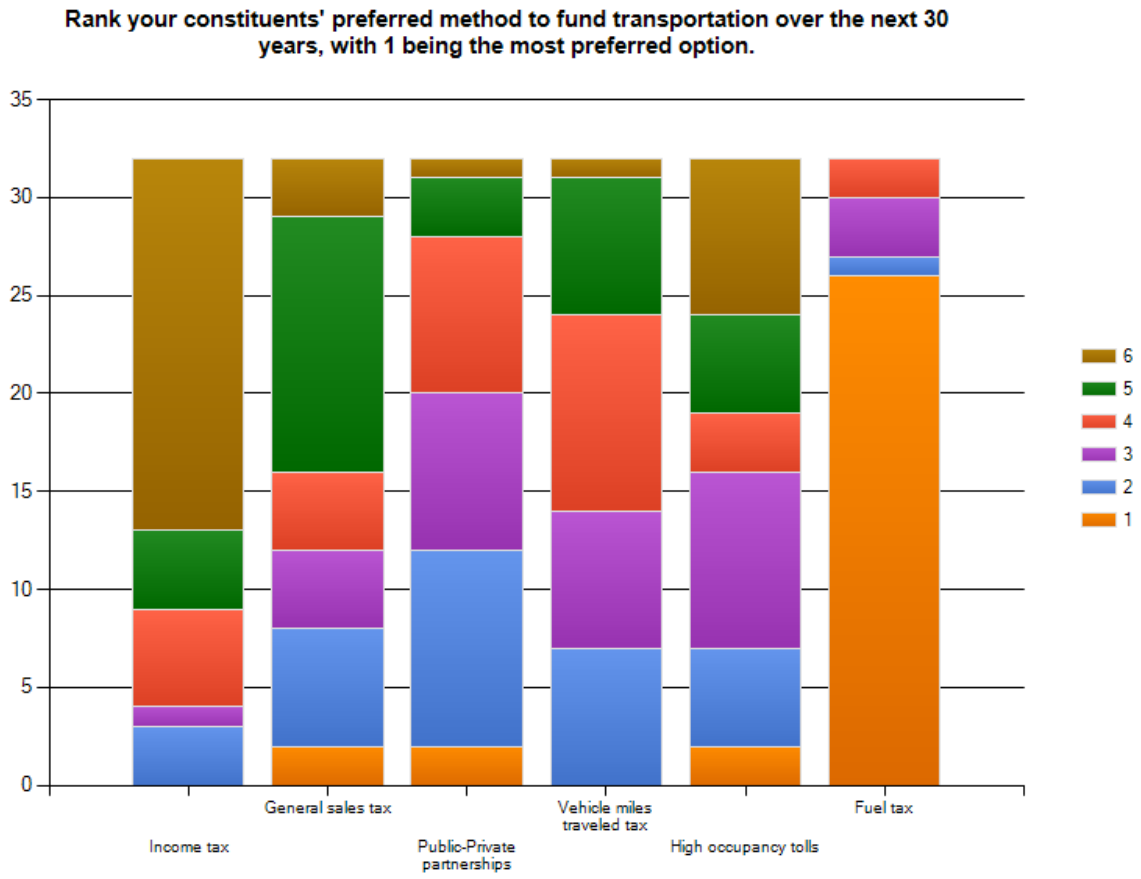


Respondents also were asked to address technological and implementation issues with VMT, as discussed in the literature. Over 60% of respondents thought the needed technology did not exist yet, or it would be too difficult to implement in vehicles, or both. The opposing responses thought a VMT tax would be feasible currently, both from an implementation and technological perspective. While there was a clear majority here, it was surprising how large the minority was. It was expected that there would be more of consensus on this question. This may indicate differing views on what constitutes technological readiness. This particular issue has a significant amount of depth and quite a bit of research could be done comparing existing technological options with "ideal" technology for implementing VMT. These options could be presented to transportation officials to reveal a greater depth to their views on technology as it relates to this subject.



Another wrinkle in this discussion is generational views on privacy. Younger generations seem willing and eager to share their life details on social media: what they are doing, where they are doing it, and who with. It stands to reason that as younger generations supplant older ones, the privacy barrier for VMT taxes may come down gradually and gently. Since a new funding strategy probably will not be needed for a minimum of 10-15 years, a generational shift could have real impacts on the feasibility of this type of funding. Further research could help identify trends in this area, including a target date when a majority of the general public may be willing to overlook privacy issues with VMT.

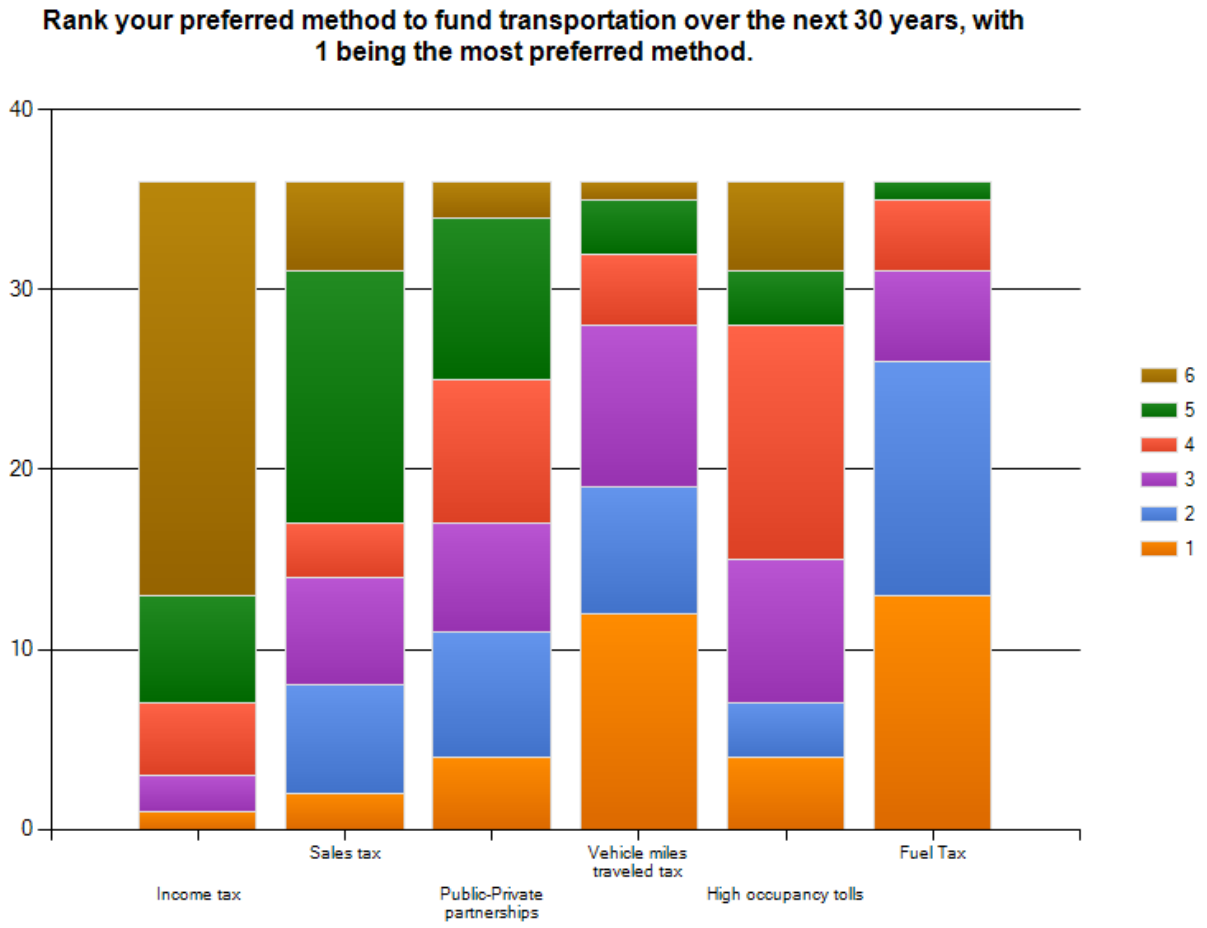
The final question asked respondents to speculate about their constituents' preferred method to fund transportation over the next 30 years. As seen below, the fuel tax was the overwhelming first choice.



While not surprising, given the results explored earlier in the survey, it nevertheless shows the power of the status quo. PPPs were the second preferred choice. Although the literature review explained why PPPs are not a revenue source, but rather a funding mechanism, they were included as an option because some still incorrectly view them as a new source of revenue. One positive that can be taken from this result it that communication with the public about transportation issues works. PPPs have been at the forefront of transportation funding discussions for some time. While certainly discussed among professionals, information about PPPs has gotten out to the public as well. From the survey, it is clear the public has responded positively to this information. Behind PPPs were VMT and HOT, with sales and income taxes coming in as the least favorable options. As additional information continues to be disseminated

to the general public about the variety of funding options available, it is expected that VMT and HOT pricing structures would have a better showing.

As shown below, when comparing the preferences of professionals and laymen, the main contrasting items were PPPs and VMT. DOT officials seem to have a better understanding that PPPs are a funding mechanism, and therefore ranked them as the fourth option, while the public ranked them second. Professionals also ranked VMT second, just behind the fuel tax, while the public ranked VMT fourth.



Summary

In the literature, a bleak picture was painted of fuel taxes. This outlook was echoed in the survey of DOT professionals, with 90% of respondents either very concerned or extremely concerned about the long-term viability of fuel taxes, and 83% expressing a need for a new source of transportation funding. While the probabilities of fuel taxes being raised in the near future was higher than expected in one response set, it was still low, with 60% of states being unlikely to raise their fuel taxes in the next five years. These results were analyzed based on the region of the country in which the replies were received, and there was little variance in answers, even with a limited survey set.

Even with their concerns, a surprisingly large number of professionals still preferred the fuel taxes as a long-term source of transportation revenue. In fact, 60% of respondents ranked fuel taxes as their first or second choice. VMT was the other major choice, with 50% ranking it as the first or second choice. HOT lanes, PPPs, and sales taxes were clustered around third place. The public's perceived preference for the fuel tax was even more pronounced, with 80% of respondents ranking the fuel tax as the most preferred option. Compared with the opinions of professionals, the only other major difference was the public had a much higher opinion of PPPs, and a lower opinion of VMT taxes slotting them as the second and fourth preferences, respectively. Income and sales taxes were at the bottom of the public's preferences.

The legality of tolling in individual states was split around 50/50, if including states that were planning on lifting toll restrictions. However, even without legal roadblocks, almost 90% said their constituents would oppose tolling "free" roadways, even if fuel taxes were reduced to offset tolling costs. When asked a similar question about if drivers would pay to reach their destination quicker or would prefer to "pay" with more time in congestion, respondents gave

mixed responses. Half of the respondents were not sure, while a majority of the remaining respondents suggested that drivers would prefer a slower trip with no toll. In a later query, results were favorable toward tolls, with respondents believing constituents would be open to tolling if it reduced rush hour congestion. Income equity issues related to HOT lanes, as reviewed in the literature, certainly seemed relevant based on survey results as well.

The feasibility of income and sales taxes providing a reliable revenue source was covered in the literature, with sales taxes garnering a sizeable following as a potential solution. However, both options received discouraging results from the survey. Support for user fees was close to unanimous, an approach both income and sales taxes deviate from. Two thirds of DOT officials stated directly they did not favor income or sales taxes as an approach to transportation funding. While additional questions about income equity provided tepid support for these options, when combined with the whole of the survey, the answers to these few questions seemed to be lip service.

VMT taxes, although not understood broadly, were well known to professionals, with a unanimous "yes" received from respondents when asked if they were familiar with this funding mechanism. Privacy concerns were acknowledged, both in the opinion of professionals, and their opinion of their constituents. However, this group personally felt the benefits of VMT taxes outweighed the concerns. The public's assumed view was cause for concern, with two thirds of respondents indicating a high level of privacy concerns from the data collection that would be necessary for a VMT system to work. Professionals were not as confident that technology implementation and data collection issues could be overcome at this time, with 60% listing one or both of these issues as a barrier VMT must overcome.

Conclusion

To make a seismic shift into a new transportation funding source, it is clear more information is needed, and more communication needs to take place. The central issue at hand, as illustrated by the survey, is a disconnect between DOT officials and the general public. While professionals have a sense of urgency related to transportation funding, the public either does not understand or dismisses concerns about the fuel tax. In order to harmonize these viewpoints, education and communication between both groups will be needed. DOT officials should take every opportunity to inform the public of their concerns and outline potential solutions. By planting these seeds before a funding change *has* to be made, there will be time to let this information germinate, hopefully leading to a collaborative effort between the two groups when a change does need to be made.

Suggestions for Future Research

The transportation funding survey covered a lot of ground, but it showed there are plenty of further opportunities for research in this area, both in breadth and depth of the subject. Based on the survey results, here are some topics that could use some more research:

- Why do transportation professionals put fuel taxes on equal footing with the VMT taxes when they have such pronounced concerns about the viability of fuel taxes long term?
- Why do both professionals and the public generally support a user-fee approach? This is contrary to the progressive income tax system in the United States, where those with higher incomes subsidize public services for those with lower incomes. If the user-fee approach creates efficiencies in the transportation system, would this same concept apply to other public services? If not, why?
- What is the price point where drivers are willing to pay more for decreased travel times as part of a HOT pricing scheme? How does this vary by road type, area of the country, etc.?
- Regarding technology and implementation, how feasible is a VMT pricing scheme in the present? Five years from now? Ten years from now? If not feasible, what areas need to be addressed?
- How is social media changing the way the public views privacy? How would this affect concerns related to VMT?

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Glossary of Terms

CAFE- Corporate Average Fuel Economy

CBO- Congressional Budget Office

DOT- Department of Transportation

GPS- Global Positioning Satellite

HOT- High Occupancy Toll

HOV- High Occupancy Vehicle

HTF- Highway Trust Fund

MoDOT- Missouri Department of Transportation

MPG- Miles Per Gallon

NSTPRC- The National Surface Transportation Policy and Revenue Study Commission

PPP- Public-Private Partnership

TRB- Transportation Research Board

VMT- Vehicle Miles Traveled

Appendix- Survey Results

Transportation Funding Options

SurveyMonkey

1. What area of the country do you work in?

	Response Percent	Response Count
Northeast	19.4%	7
Southeast	**30.6%**	**11**
Midwest	27.8%	10
Northwest	8.3%	3
Southwest	13.9%	5
	answered question	**36**
	skipped question	**0**

2. How concerned are you about the ability of fuel taxes to provide a long-term source of revenue (30+ years) for transportation funding?

	Response Percent	Response Count
Not at all concerned	0.0%	0
Mildly concerned	5.6%	2
Moderately concerned	5.6%	2
Very concerned	30.6%	11
Extremely concerned	**58.3%**	**21**
	answered question	**36**
	skipped question	**0**

3. How likely is an increase in your state's fuel taxes, or an increase in federal fuel taxes, in the next 5 years?

	Response Percent	Response Count
Extremely likely	2.8%	1
Very likely	19.4%	7
Moderately likely	19.4%	7
Unlikely	**36.1%**	**13**
Extremely Unlikely	22.2%	8
	answered question	**36**
	skipped question	**0**

4. Rate the need for a new source of transportation funding in your state.

	Response Percent	Response Count
Very High	**50.0%**	**18**
High	33.3%	12
Medium	16.7%	6
Low	0.0%	0
Very Low	0.0%	0
	answered question	**36**
	skipped question	**0**

5. What method(s) to fund transportation over the next 30 years has your state considered? (Select all that apply)

	Response Percent	Response Count
Income tax	0.0%	0
Sales tax	36.1%	13
Public-Private partnerships	**75.0%**	**27**
Vehicle miles traveled tax	36.1%	13
High occupancy tolls	50.0%	18
Other	52.8%	19
	answered question	**36**
	skipped question	**0**

6. Rank your preferred method to fund transportation over the next 30 years, with 1 being the most preferred method.

	1	2	3	4	5	6	Rating Average	Response Count
Income tax	2.8% (1)	0.0% (0)	5.6% (2)	11.1% (4)	16.7% (6)	**63.9% (23)**	5.31	36
Sales tax	5.6% (2)	16.7% (6)	16.7% (6)	8.3% (3)	**38.9% (14)**	13.9% (5)	4.00	36
Public-Private partnerships	11.1% (4)	19.4% (7)	16.7% (6)	22.2% (8)	**25.0% (9)**	5.6% (2)	3.47	36
Vehicle miles traveled tax	**33.3% (12)**	19.4% (7)	25.0% (9)	11.1% (4)	8.3% (3)	2.8% (1)	2.50	36
High occupancy tolls	11.1% (4)	8.3% (3)	22.2% (8)	**36.1% (13)**	8.3% (3)	13.9% (5)	3.64	36
Fuel Tax	**36.1% (13)**	**36.1% (13)**	13.9% (5)	11.1% (4)	2.8% (1)	0.0% (0)	2.08	36
						answered question		**36**
						skipped question		**0**

7. How high of a priority is transportation funding compared to other issues for your constituents?

	Response Percent	Response Count
Very high	11.1%	4
High	25.0%	9
Medium	**41.7%**	**15**
Low	16.7%	6
Very low	5.6%	2
I'm not sure	0.0%	0
	answered question	**36**
	skipped question	**0**

8. What strategy would your constituents prefer to fund transportation?

	Response Percent	Response Count
Local	2.8%	1
Regional	22.2%	8
National	27.8%	10
I'm not sure	**47.2%**	**17**
	answered question	**36**
	skipped question	**0**

9. Does your state have restrictions against tolling existing roads?

		Response Percent	Response Count
Yes, and there are no plans to change these restrictions		**45.7%**	**16**
Yes, but there are plans to change these restrictions		20.0%	7
No		34.3%	12
		answered question	**35**
		skipped question	**1**

10. How would your constituents react to paying for roads that are currently free (not tolled), even if they paid a reduced fuel tax?

		Response Percent	Response Count
Oppose forcefully		**54.3%**	**19**
Oppose mildly		34.3%	12
Be neutral		0.0%	0
Support mildly		0.0%	0
Support forcefully		2.9%	1
I'm not sure		8.6%	3
		answered question	**35**
		skipped question	**1**

11. Would your constituents prefer to:

	Response Percent	Response Count
Reach their destination more slowly, and not pay a toll	31.4%	11
Reach their destination more quickly, and pay a toll	20.0%	7
I'm not sure	**48.6%**	**17**
	answered question	**35**
	skipped question	**1**

12. If a roadway contained both tolled lanes with no congestion, and free lanes that were congested, would your constituents have concerns that tolled lanes were only accessible to wealthy drivers?

	Response Percent	Response Count
Yes	**68.6%**	**24**
No	8.6%	3
I'm not sure	22.9%	8
	answered question	**35**
	skipped question	**1**

13. Would your constituents be open to tolls on roadways if they helped decrease rush hour congestion?

	Response Percent	Response Count
Yes	40.0%	14
No	22.9%	8
I'm not sure	37.1%	13
answered question		35
skipped question		1

14. How important is it to your constituents that potential funding options could affect various income levels differently?

	Response Percent	Response Count
Extremely important	9.1%	3
Very important	45.5%	15
Inconsequential	12.1%	4
Unimportant	0.0%	0
Extremely unimportant	0.0%	0
I'm not sure	33.3%	11
answered question		33
skipped question		3

15. Do your constituents think a transportation tax should be equally allocated across income levels, or should higher incomes pay a larger percentage of transportation tax?

	Response Percent	Response Count
Equally allocated across income levels	36.4%	12
Higher incomes pay a larger percentage	15.2%	5
I'm not sure	**48.5%**	**16**
	answered question	**33**
	skipped question	**3**

16. Would your constituents prefer to pay a small tax many times, or a large tax a few times?

	Response Percent	Response Count
Small tax, many times	48.5%	16
Large tax, few times	0.0%	0
I'm not sure	**51.5%**	**17**
	answered question	**33**
	skipped question	**3**

17. Do you support the user fee approach to funding transportation?

	Response Percent	Response Count
Yes	93.9%	31
No	3.0%	1
I'm not sure	3.0%	1
answered question		33
skipped question		3

18. If in favor of an income tax or sales tax approach to funding transportation, are you concerned about moving away from user fees?

	Response Percent	Response Count
I'm not concerned	3.0%	1
I'm concerned, but I still think income or sales taxes are the best option.	15.2%	5
I'm not sure	15.2%	5
I'm not in favor of the income or sales tax approach.	**66.7%**	**22**
answered question		33
skipped question		3

19. Are you familiar with a vehicle miles traveled tax as a way to generate transportation revenue?

	Response Percent	Response Count
Yes	100.0%	33
No	0.0%	0
answered question		33
skipped question		3

20. Do you think privacy concerns are a barrier to implementing a vehicle miles traveled tax, assuming vehicle use must tracked and reported?

	Response Percent	Response Count
Yes, the privacy concern is too large to implement this revenue tactic	31.3%	10
Yes, but the benefits outweigh the concerns	**62.5%**	**20**
No, privacy concerns are not a significant barrier to this revenue tactic	6.3%	2
answered question		32
skipped question		4

21. How concerned are your constituents about privacy regarding a vehicle miles traveled tax?

	Response Percent	Response Count
Extremely concerned	21.9%	7
Very concerned	**28.1%**	**9**
Somewhat concerned	25.0%	8
Indifferent	6.3%	2
I'm not sure	18.8%	6
	answered question	**32**
	skipped question	**4**

22. Do you think transitioning vehicles to include recording and communicating equipment is a barrier to implementing a vehicle miles traveled tax?

	Response Percent	Response Count
Yes, because it will take too long to retrofit existing vehicles and design new vehicles	21.9%	7
Yes, because the needed technology doesn't exist yet	6.3%	2
A & B	31.3%	10
No, installing new hardware is feasible, and the technology exists	**40.6%**	**13**
	answered question	**32**
	skipped question	**4**

23. Rank your constituents' preferred method to fund transportation over the next 30 years, with 1 being the most preferred option.

	1	2	3	4	5	6	Rating Average	Response Count
Income tax	0.0% (0)	9.4% (3)	3.1% (1)	15.6% (5)	12.5% (4)	**59.4% (19)**	5.09	32
General sales tax	6.3% (2)	18.8% (6)	12.5% (4)	12.5% (4)	**40.6% (13)**	9.4% (3)	3.91	32
Public-Private partnerships	6.3% (2)	**31.3% (10)**	25.0% (8)	25.0% (8)	9.4% (3)	3.1% (1)	3.09	32
Vehicle miles traveled tax	0.0% (0)	21.9% (7)	21.9% (7)	**31.3% (10)**	21.9% (7)	3.1% (1)	3.63	32
High occupancy tolls	6.3% (2)	15.6% (5)	**28.1% (9)**	9.4% (3)	15.6% (5)	25.0% (8)	3.88	32
Fuel tax	**81.3% (26)**	3.1% (1)	9.4% (3)	6.3% (2)	0.0% (0)	0.0% (0)	1.41	32
						answered question		**32**
						skipped question		**4**