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Ending Congestion by Refinancing Highways

by Randal O'Toole

Executive Summary

Although gasoline taxes have long been the main source of funding for building, maintaining, and operating America's network of highways, roads, and streets, the tax is at best an imperfect user fee. As such, Congress and the states should take action to transition from gas taxes to more efficient vehicle-mile fees.

One of the major failings of gas taxes is that they fail to price congested roads properly. As a result, travelers suffer from more than $100 billion worth of annual delays, and the costs to businesses are tens of billions of dollars more.

A second problem is that gas taxes fail to pay for all road costs. While gas taxes collected by federal and state governments cover all or nearly all state highway costs, local governments spend about $30 billion a year out of general funds on local roads and streets.

A third problem is that inflation and increasingly fuel-efficient cars rapidly erode gas tax revenues. After adjusting for inflation, drivers today pay only a third as much for each mile they drive as they did in 1956, when Congress created the Interstate Highway System.

To fix these and other problems with gas taxes, this paper proposes an affordable vehicle-mile fee system that preserves traveler privacy, eliminates nearly all traffic congestion, adequately funds all federal, state, and local roads, and does so in a revenue-neutral manner after eliminating gas taxes and local road subsidies. In fact, in the long run the proposal may even reduce total road costs and fees because it would give road agencies incentives to operate more efficiently.

The replacement of gas taxes with vehicle-mile fees should take place as quickly as possible. This means Congress should immediately begin to phase out federal gas taxes, the American Association of State Highway and Transportation Officials should write standards that would allow vehicle-mile fee systems to work across state lines, and individual state legislatures should set target dates for complete conversion from gas taxes to vehicle-mile fees in their states.

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Introduction

America's highway network was once the envy of the world, but today much of it suffers from terrible traffic congestion. According to the Texas Transportation Institute (TTI), the monetized cost of urban congestion quintupled between 1982 and 2007, and though it declined slightly since then due to the recession, it is still more than $100 billion a year. Moreover, the TTI urban mobility report only counts some congestion costs; the total cost is likely closer to $200 billion.

This congestion is related to several other problems with America's system of highways, roads, and streets. First, the system of financing roads using gasoline taxes fails to keep up with inflation and increasingly fuel-efficient cars. After adjusting for inflation, the amount of gas tax motorists pay for every mile they drive is only one-third the amount paid in 1956, the year Congress created the Interstate Highway System.

Second, the notion of using gas taxes as a highway user fee was never perfect because the taxes people paid were not directly connected to the specific roads they used. This meant that the taxes failed to give road users the appropriate signals about the cost of using different roads, and the revenues failed to give road providers signals about the actual demand for various roads.

This imperfection is particularly acute at the local government level. Federal and state governments collect most gas taxes, while local governments own a large portion of the road system. A few local governments collect gas taxes, and most states share some of their gas tax revenues with local governments, but local governments are still forced to spend around $30 billion per year in general funds on roads.

Third, and partly because of the last point, at least some roads and bridges are in poor condition. Some writers and special interest groups have overstated this problem: the number of bridges classified as "structurally deficient" has steadily declined and the average quality of pavement has steadily increased. But these trends are far from uniform, and roads are in poor shape in some states and many local areas (perhaps because local road agencies must compete for general funds to maintain their roads).

Finally, exacerbating all these problems, highways have been under attack by environmental and other groups for several decades. Rather than evaluate highway questions as institutional and finance problems, these groups treat highway problems as cultural issues, and their goal is to promote a major cultural change on the part of Americans, moving them away from personal vehicle travel in favor of mass transit or foot travel. This is simply wrong: Americans, along with people in other developed nations, drive because it is more efficient and convenient than other forms of travel for most trips, not because of some "pro-automobile" cultural value. Yet advocates of this view have persuaded many state and local highway agencies to avoid expanding roads to meet demand and even to neglect existing roads.

Increasing gas taxes can solve some, but not all, of these problems. It may compensate for inflation and more fuel-efficient cars, but only until there is more inflation and/or cars become more fuel-efficient. But simply raising taxes does little to address the problems of localized road costs, targeting congestion, and other problems associated with the inefficient practice of paying for roads through federal and state gas taxes.

Instead of raising gas taxes, this paper proposes to finance highways, roads, and streets through an entirely new system. This system would replace gasoline taxes with vehicle-mile fees collected electronically while preserving traveler privacy. The revenue from these fees would be directed to the actual owners of the roads used, thus ensuring that local governments or other road owners have sufficient funds to maintain and operate roads without subsidies. Fees could vary by time of day in order to prevent congestion by encouraging people to drive at less congested times, thus making better use of the road system. Making state and local road

agencies self-sufficient would help insulate them from political pressure from groups who mistakenly view highways as a cultural issue.

The Cost of Congestion

The TTI *2011 Urban Mobility Report* estimates that congestion cost commuters $101 billion in 2010.[1] However, TTI only counts the costs to individual auto drivers, including the gasoline and time wasted in congestion. This ignores many other problems created by congestion:

- Because commuters have limits on how much time they will spend traveling to work, congestion reduces the pool of skilled workers available to employers and, conversely, reduces the number of jobs available to any given worker. Studies have shown that faster commutes lead to higher worker productivity. By slowing commutes, congestion reduces worker productivity.[2]
- Supply and delivery companies must buy and operate additional trucks and other equipment to make on-time deliveries in congested traffic.
- Retailers must charge more for goods when congestion increases the cost of transporting those goods to their stores.
- Entertainment centers such as sports arenas and concert halls have a smaller pool of potential audience members.
- Congestion slows the response time of emergency service vehicles.

Given those and other costs, it is likely that the total cost of congestion is close to, if not more than, double the cost to commuters estimated by TTI.

Normally, when someone says a particular program or activity wastes billions of dollars a year, close evaluation reveals that some people benefit from the waste. Those people tend to form special interest groups demanding that the program continue. Congestion, however, has no clear beneficiary. Few private parties benefit from congestion, nor do many public employees have jobs that depend on congestion. Other than for anti-auto people who experience a perverse joy in seeing other people stuck in traffic, congestion is for the most part a dead-weight loss to society. This makes it all the more incredible that so little has been done to reduce traffic congestion.

Solving Congestion

Highway congestion is really two separate problems, one obvious and the other more obscure. First, congestion takes place when traffic flows exceed the maximum flow capacity of roads. Each lane of a limited-access highway, for example, has a maximum flow capacity of about 2,000 to 2,200 vehicles per hour. Obviously, when traffic flows exceed this capacity, traffic slows down. If this were the only problem, congestion would be a much less serious issue.

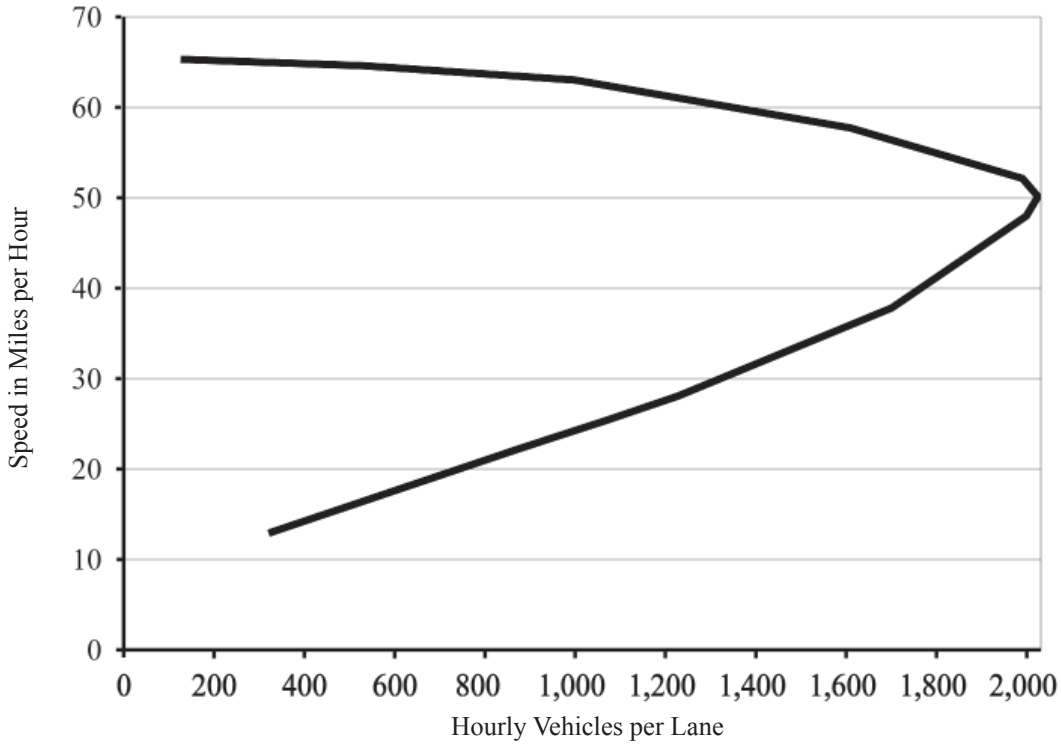
The subtle problem is that, when traffic slows down, the flow capacity of the road declines and that decline is persistent. Figure 1 shows traffic flows on an individual freeway in vehicles per hour. This figure is based on actual observations on various highways and is more often portrayed in traffic manuals as a scatter diagram, with speeds and flows of each observation represented as a single dot. For clarity, the pattern of dots has been collapsed to a line in the figure.

Figure 1 shows that traffic can maintain high speeds so long as there are no more than about 1,000 vehicles per hour. When flows increase beyond that, speeds decline slowly until the maximum flow capacity of the lane is reached—2,000 vehicles per hour in Figure 1—at speeds that are somewhat slower than the typical maximum speed limit for highways.

Then something peculiar happens. If traffic flows grow above the maximum flow capacity of the road, speeds dramatically decline, and with falling speeds the flow capacity of the road also declines. At 25 miles per

The subtle problem with traffic congestion is that, when traffic slows down, the flow capacity of the road declines and that decline is persistent.

Figure 1
Traffic Flows



Source: Based on observations reported in Washington State Department of Transportation, "Delay and Efficiency," 2012, tinyurl.com/6tuzyl9. Note: Observations of freeway speeds and flows indicate that speeds can exceed 65 mph when fewer than 1,000 vehicles try to use a lane each hour. As flows rise from 1,000 to 2,000 vehicles per hour, speeds slow to 50 mph. Above 2,000 vehicles per hour—more or less depending on the road—flows break down and speeds and flow capacities both fall to very low levels. Speeds cannot then increase until actual flows fall below the reduced flow capacities, which may take several hours even if flows exceeded the 2,000 vehicle maximum capacity for only a few minutes.

Highways are unusual, if not unique, in that their supply decreases when demand increases.

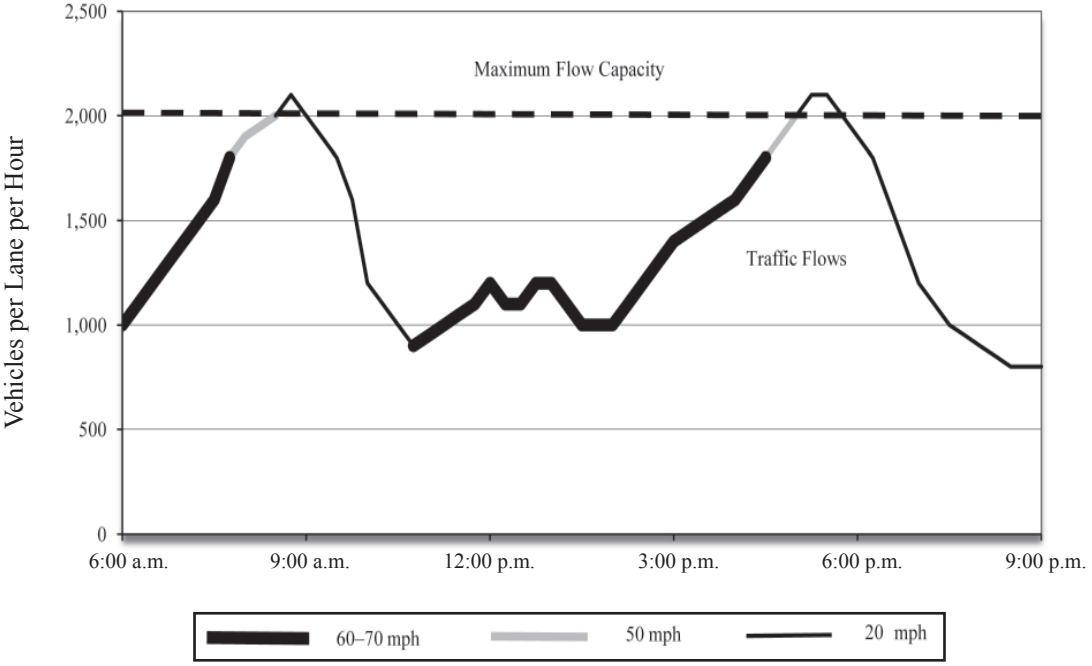
hour, the lane can only move about 1,000 vehicles per hour, meaning that increased traffic has cut in half the capacity of the lane to move that traffic.

Highways are thus unusual, if not unique, in that their supply decreases when demand increases. The number of rooms in resort hotels does not decline during vacation seasons, and the number of seats on commercial airlines does not decline during Thanksgiving and Christmas travel periods, but the flow capacity of roads does decline when demand increases. It is this problem that makes congestion such a serious issue, but little effort has been made to fix it.

Figure 2, which illustrates typical urban freeway flows over the course of a day, shows why this subtle problem is far more serious than the obvious problem of flows exceeding maximum flow capacities. In the figure, the horizontal dashed line represents the maximum flow capacity of a lane while the solid line represents actual traffic flows. The thickness of the solid line represents average speeds experienced by drivers: a very thick line indicates speeds of 60–70 mph; a slightly thinner, gray line represents speeds of 50 mph; while the thinnest line represents much slower speeds found in stop-and-go traffic.

The figure indicates that traffic flows briefly exceed maximum flow capacities at around 9 a.m. and again around 5:30 p.m. as a large volume of commuter traffic enters the highway. However, right after that initial peak, congestion causes speeds to slow to around 20

Figure 2
Freeway Capacities and Flow



Note: Traffic flows may exceed maximum flow capacities for only a few minutes during each rush-hour period, but the resulting slow-downs of traffic can last for hours until actual flows are less than the diminished flow capacities at the slower speeds.

mph and remain there for an extended period of time even though fewer vehicles are entering the roadway. As a result, the flow capacity of the lane falls to around 1,000 vehicles per hour and remains there until actual traffic flow falls below that amount. This means people can be stuck in stop-and-go traffic for hours even when flows exceed the maximum capacities for only a few minutes.

In most cities, there is good reason to think that actual traffic flows exceed the maximum flow capacities for only a few minutes each day. Once flows exceed capacities, traffic flows shrink due to congestion and people alter their travel habits to avoid that congestion. They may shift the time they travel, their travel route or destination (for example, by changing job locations), or, in a small share of cases, their mode of travel. For this reason, efforts to relieve congestion by improving alternate modes of travel, such as rail transit, will deliver little relief: any congestion relief initially provided by transit will simply result in some people shifting back to driving during the peak periods.

Economists have long proposed to use pricing to relieve congestion because congestion pricing would avoid the shift-back problem. If tolls increase as the usage rate increases, and the maximum tolls are high enough that actual flows never exceed the maximum capacities, then road capacities are nearly doubled for those hours that flows would otherwise break down into stop-and-go traffic. An additional benefit is that the revenue generated from the tolls would be used to operate, maintain, and expand the roadway where the toll was collected. This policy is usually presented as a choice: people can sit in traffic, which is a deadweight-loss to society, or they can pay a toll and avoid congestion and know that their toll fee is doing some good, such as improving roads to relieve congestion. Yes, tolls would lead some people to change their departure times to avoid the tolls, but people are already chang-

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ing their departure times to avoid the congestion.

Congestion-pricing advocates rarely mention the subtle effect of congestion: the hours of delay after traffic flows fall below the maximum flow capacities. By using tolls to prevent congestion, highway capacities can be nearly doubled for several hours of the day, thus making it possible for many people to shift their departure times back to times they would have considered preferable were it not for the congestion. In other words, paradoxically, tolls actually increase highway capacities and allow more people to travel when they want to travel.

HOT lane tolls must be high six hours a day, but if all lanes are tolls, tolls must be high only about three hours a day.

Despite the very real public benefits of tolling and the resulting realignment of incentives, some people object fervently to the policy. The objections are political and emotional. People resent being charged for something that was once "free," and in particular for something they believe they have already paid for through gasoline taxes. In response, supporters of congestion pricing have proposed the introduction of congestion tolling "one lane at a time" by providing separate "high-occupancy toll" (HOT) lanes that parallel existing free or "general-purpose" lanes. This gives drivers of low-occupancy vehicles a choice: drive on the free lanes in potentially stop-and-go traffic or pay a toll to drive on the HOT lanes.

While HOT lanes seem more politically acceptable, they have a flaw. Since they do not prevent flows on the parallel general-purpose lanes from exceeding maximum capacities, those lanes can suffer from stop-and-go traffic for several hours of the day even after actual flows fall below the maximum capacities. This means charges on the HOT lanes must remain high during much of the day as people seek to avoid the congested lanes that are moving only half the number of vehicles that they could.

If congestion pricing is applied to all lanes, then none of the lane capacities would fall below their maximums, thus significantly increasing the ability of the entire highway to move traffic rather than just the priced lanes. Moreover, if (in the absence of tolling) the actual flows would exceed maximum capacities for only a few minutes of the day, then the maximum tolls would be applied for shorter periods than in the case of HOT lanes. In Figure 2, HOT lane tolls would be high whenever the speeds in nontoll lanes fell to or below 50 mph, or about six hours a day. But if all lanes were priced, then tolls would be highest only when use might exceed around 1,800 vehicles per hour (90 percent of the maximum flow capacity), or about three hours a day.

London, Milan, Singapore, and Stockholm use another pricing scheme that is sometimes called "congestion pricing" but should more accurately be called "cordon pricing." These cities have drawn a line around some district, such as the center of London, and require that any vehicle that crosses the line must pay a fee. Although the fee may vary by time of day, this system is almost as crude a user fee as the gas tax because it does not distinguish between routes that are congested and routes that are not.

A clear understanding of these facts should reduce the political problems with tolling entire highways, and any remaining problems should decline even more when such tolling is accompanied by an overhaul of the entire highway finance system. While other tolling proposals merely apply tolls on top of existing gasoline taxes, a complete overhaul would eliminate gas taxes, thus making it clear that people aren't "paying twice" for the roads they drive on.

Congestion pricing of entire freeway networks has been successfully used to relieve congestion in several cities around the world. In 2004 Santiago de Chile introduced variable tolling of major highways in the city, and this proved to greatly reduce travel times and improve highway safety.[3] Norway instituted congestion pricing on major highways in Bergen, Oslo, and Trondheim, which has both helped finance those roads and relieved congestion.[4] Several highways in France use congestion pricing of all lanes, which has significantly reduced traffic delay.[5] In the United States, congestion pricing of all lanes, as opposed to HOT lanes, has relieved congestion on bridges in New York City and San

Francisco as well as on several bridges and highways in Florida.[6]

The Problem with Gas Taxes

For more than 50 years, the gasoline tax has been the primary source of funds for federal and state highways. Thanks to the gas tax, the funds to build, operate, and maintain these transportation facilities have largely come from highway users and not from taxpayers in general. Yet the gas tax is a highly inefficient way to fund highways because it creates perverse incentives, instead of proper incentives, for roadway infrastructure. This problem can be illustrated by an analogy.

Suppose that, instead of paying for groceries in the per-item manner used today, grocers would instead charge shoppers a "cart rental fee" to cover all the grocers' costs. On the surface, this might seem like a workable idea: the more groceries a shopper gathered, the longer he would use the cart and the more he would pay. While the grocer could no doubt come up with a payment schedule that would cover costs, this method of payment would lead to problems with store inventory. This would be especially true if the grocer were only rarely allowed to raise the shopping cart rental rate.

Given fixed rental rates, grocers would, over time, have to cut corners to cover costs as profit margins eroded by inflation. Moreover, customers would soon learn ways to make more effective use of shopping carts so they could spend the minimum number of minutes obtaining items with the maximum value during each visit. People paying by the minute would be more likely to buy the most expensive types and brands of each product. They would routinely choose filet mignon instead of hamburger, Honeycrisp apples instead of Red Delicious, and organic milk instead of regular milk. This means that the expensive products would soon run short, leaving disgruntled customers. Customers would soon learn each store's delivery schedules and form long lines when the filet mignon, Honeycrisps, and organic products were delivered, wasting the time of other customers and requiring the stores to hire extra employees during those times. These are the sorts of problems and inefficiencies that occur when consumers are not charged directly for the goods and services they consume.

The same problems result from paying for roads using gas taxes. First, the federal gas tax and most state gas taxes are not indexed to inflation. Between 1956 and 2006, highway construction costs increased by about 10 times.[7] Yet in the same period the combined federal and average state gas tax grew by barely 5 times, from 8.4 cents to 47 cents a gallon.[8] This means the tax on one gallon of gasoline buys only about half as much highway work as it did in 1956.

A second problem is that cars today are far more fuel-efficient than they were in 1956. When Congress created the Interstate Highway System, the average car on the road could drive just 14.4 miles on a gallon of gasoline; by 2009 the average was 23.8 miles per gallon, a 65 percent improvement.[9] When combined with inflation, this means the tax paid by car owners per mile of driving is less than a third of what their parents or grandparents paid in 1956.

A related problem is the increasing number of electric-powered vehicles, including plug-in hybrids, entering the market. When powered by electricity, these vehicles contribute nothing to the cost of the highways they use. But their use nonetheless consumes highway capacity.

A third problem is that the gas tax does not account for the fact that some roads cost more per mile of driving than others. One lane-mile of an interstate highway may cost much more to build than one mile of rural road, but if the interstate receives far more use than the rural road, the rural road's cost per mile of driving might be greater. In fact, considering the heavy use of urban interstates, it is likely that the people who pay gas taxes to drive on those roads effectively cross-subsidize people who drive on lesser-used rural roads.

A fourth problem is that gas taxes are mainly used for federal and state highways. Over the last

Paying for roads with gas taxes is like paying for groceries through shopping cart rentals: shoppers would choose filet mignon instead of hamburger.

Table 1
User Fees and General Funds Spent on Highways (average of 2000–2009 in millions of dollars)

	User Fees	General Funds	Offsetting Diversions	Net Subsidies
Federal	36,395	3,813	6,728	–2,916
State	66,682	9,738	12,597	–2,858
Local	4,454	29,758	1,006	28,751

Source: Federal Highway Administration, Highway Statistics 2000 through 2009, Table HF-10. Note: An accurate accounting of highway subsidies requires that diversions from highway user fees, such as gas taxes and tolls, to nonhighway programs be subtracted from the general funds that are spent on roads. Some highway costs are paid for out of bond revenues, but these bonds will ultimately be repaid out of either user fees or general funds so only user fees and general funds need be considered as revenues. In the "net subsidies" column, a positive number indicates a subsidy while a negative number indicates that highway users are subsidizing other programs with their fees. State user fees are shown less collection costs.

Local governments have had to spend nearly $30 billion a year in general funds on roads and streets.

10 years for which data are available, the federal government and the 50 combined states each collected an annual average of about $2.9 billion more from highway users than they spent on highways (see Table 1). But local governments collected only about $4.5 billion from highway users and (after diverting $1 billion of those user fees to other uses) had to spend about $29.8 billion in general funds on highways.[10] A truly fair highway user fee would pay for city and county roads as well as state highways.

The 2005 federal transportation bill (the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users) mandated spending at prescribed levels even if user fees did not cover that spending. This forced Congress to appropriate more than $20 billion in general funds in 2008 and 2009 to the Highway Trust Fund. Despite this, diversions of federal highway user fees to transit and other programs between 2000 and 2009 exceeded federal general funds spent on roads.

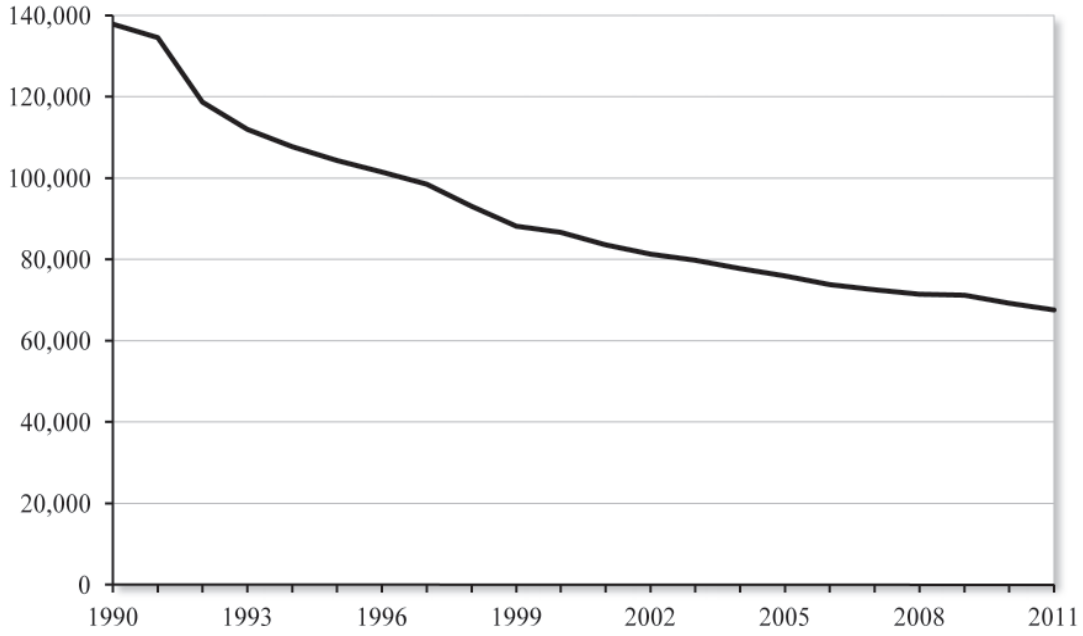
Highway and Bridge Conditions

In recent years Americans have been besieged by reports that the nation is in the midst of an infrastructure crisis.[11] Those claims are simply wrong, at least with respect to highways and bridges. Nationally, the number of bridges considered "structurally deficient" has declined in every year since 1990 (the earliest year for which data are available). Where nearly 138,000 bridges were so classified in 1990, by 2011 the number had declined more than 50 percent to less than 68,000 (see Figure 3).[12] As there are more bridges today than in 1990, the percentage of deficient bridges has declined even more.

Highway conditions have also steadily improved. One measure of highway condition is the International Roughness Index, which ranges from 0 to 300 with lower numbers being smoother. As shown in Table 2, this index has steadily improved for all major highway systems.

This doesn't mean there are no problems with highway infrastructure. Local roads and bridges seem to be in poorer shape than state-owned ones. Local bridges, for example, are 60 percent more likely to be structurally deficient than state bridges.[13] While the roughness index is not available for different ownerships, Table 2 indicates that interstate freeways are considerably smoother than other arterials. Since interstates are all state owned and other arterials are more likely to be locally owned, this suggests that local roads are rougher.

Figure 3
Number of Structurally Deficient U.S. Bridges



Source: U.S. Department of Transportation.

Note: The number of structurally deficient bridges has declined in every year since 1990 and now represents 11 percent of all highway bridges.

Table 2
Average International Roughness Index

	1989	1999	2009
Rural interstates	101	88	77
Other rural principles arterials	104	97	87
Minor rural arterials	115	104	100
Urban interstates	115	104	92
Other urban freeways	124	115	101
Other principle urban arterials	N/A	139	134

Source: Author's calculations based on Federal Highway Administration, Highway Statistics for 1989, 1999, and 2009, Table HM-64.
Note: The average roughness of all major highway systems has steadily declined.

Poor road maintenance at the local level reflects a dependence on general funds rather than user fees.

The Washington state legislature has mandated a 50 percent reduction in per capita driving by 2050.

The poor maintenance record at the local level likely reflects local governments' dependence on general funds rather than user fees. Lacking a steady source of fees, and under pressure to use general funds on other activities, local governments are more likely to defer maintenance than are state governments. Changing local highway finance to a user-fee system is likely to reduce deficient bridges and improve road conditions significantly.

The Cultural Issue

In 1970 automobiles spewed large amounts of pollution into the atmosphere and auto accidents killed around 55,000 people per year. In response to those problems, Congress passed legislation mandating cleaner and safer cars.

This legislation has been hugely successful. The total number of miles Americans drive each year has increased by 167 percent since 1970.[14] Yet total toxic emissions from highway vehicles have fallen by an average of 80 percent.[15] Over the same time period, auto fatalities declined to less than 33,000 per year.[16] Moreover, both emissions and fatalities are likely to continue to fall as new cars sold each year are both cleaner and safer than the cars they replace.

Despite this progress, a segment of the environmental movement has declared war not on the negative effects of auto driving but on the auto itself. Their goal is to reduce per capita driving significantly. For example, they persuaded the Washington state legislature to mandate a 50 percent reduction in per capita driving by 2050.[17] This group opposes highway improvements and attempts to divert as large a share as possible of gasoline taxes to transit, including extraordinarily expensive rail transit projects.

Instead of improving highways, this group argues that America should rebuild cities to higher densities, build rail transit lines, and take other steps that are supposed to reduce the need for driving.[18]

This is a wrong-headed approach to the problems associated with auto driving. Transit, for example, uses no less energy than driving, and the average transit bus emits more carbon dioxide into the atmosphere per passenger mile than the average sports utility vehicle.[19] Rail transit emits less than cars only if the source of energy for the trains is renewable electricity. The electricity for many rail lines, such as the Washington, D.C., Metro, is generated by burning fossil fuels, and these lines typically emit more greenhouse gases than cars and are often comparable to sport utility vehicles.[20]

Nor is transit necessarily safer than driving. When measured per passenger-mile carried, light-rail and commuter-rail transit lines kill more people than urban driving (see Table 3). On the other hand, the safest roads in America are urban interstates, so building more highways to interstate standards would attract autos from dangerous streets to safer roads.

Unfortunately, anti-auto forces have proven highly influential in Congress and in many states. The Washington state legislature's mandate to reduce per capita driving by 50 percent is just one example. In 1991 Oregon's Land Conservation and Development Commission directed major cities in the state to reduce per capita driving by 20 percent (later amended when planners realized that a 20 percent reduction was likely to be unachievable).[21] Portland, Oregon, has deliberately neglected its street network in order to fund streetcars and bike paths.[22]

At the federal level, the Department of Transportation has recently proposed to replace rules requiring that federal transit grants meet a minimum threshold of "cost effectiveness" with new rules allowing grants to projects that supposedly improve "livability" regardless of whether they relieve congestion or improve mobility.[23] These rules will give transit agencies incentives to plan projects that increase traffic congestion on the expectation that the increased congestion will boost transit ridership.[24]

Actions such as these are both a result of and a contributing factor to the increased politicization of transportation finance. A system that funds roads directly out of fees paid by the users of those roads would depoliticize decisions and allow highway providers to take the steps needed to safely meet the needs of highway users.

Table 3
Fatality Rates from Highways and Transit Fatalities Per Billion Passenger Miles

Type of Transportation	Fatality Rate
Urban interstates	4.4
All urban roads	7.3
Buses	3.3
Heavy Rail	3.0
Commuter Rail	8.4
Light Rail	11.1

Sources: Highway rates from Federal Highway Administration, *Highway Statistics 2010*, Tables FI-20 and VM-2; transit fatalities are the total of 2001 through 2010 from U.S. Bureau of Traffic Statistics, *National Transportation Statistics,* Table 2-35 divided by the total passenger miles from 2001 through 2010 in the Federal Transit Authority's National Transit Database. Note: A 10-year average was used for transit because the sample size in one year is too small to be representative.

A More Perfect User Fee

Electronically collected vehicle-mile fees are as close to a perfect user fee as possible. With vehicle-mile fees, users pay for just the roads they use, when they use them (with the potential for appropriate exceptions as noted below). In this way, vehicle-mile fees solve all of the problems with gasoline taxes, and they can do so without any intrusions in traveler privacy. The fees can be adjusted to account for inflation, and because they are collected per mile of driving, they avoid problems with fuel-efficiency or the type of fuel that powers the automobile.

The state of Oregon has successfully tested the vehicle-mile fee concept on a small number of vehicles. In the test, about 200 volunteers had Global Positioning System (GPS) devices attached to their cars. The devices kept track of how many miles the vehicles traveled and on what roads. The state also equipped a number of gasoline stations with special pumps capable of detecting and communicating with the GPS devices.

When the operator of one of the test vehicles purchased gasoline at one of the special stations, the GPS device transmitted to the pump how much money the operator owed based on how many miles the vehicle had driven since its last fuel purchase. The only information transmitted to the pump was the total charge; information on when and where the vehicle was driven was not transmitted nor, in the Oregon experiment, even stored in the on-board GPS device.

Miles driven outside the state of Oregon were excluded. The charge for miles driven in the state varied depending on what road the vehicle used and when it was traveled. The system was transparent to the user, who simply paid the vehicle-mile fee instead of a gasoline tax as a part of the fuel purchase.

In full implementation, the GPS device could keep track of how much each vehicle used roads owned by cities, counties, states, and private parties, resulting in separate charges for each. This would allow all road owners to collect fees for actual use of their roads. The fees could vary for each road depending on the cost of that road relative to the total usage of the road. Fees on uncongested roads would be fixed in cents or fractions of cents per mile; on congested roads, fees would vary by time of day or dynamically change by the amount of congestion with the aim of keeping flows at or below 90 percent of the maximum flow capacity of the roads.

Tests in Oregon demonstrated that GPS devices can keep track of how much people owe for road use without invading people's privacy.

The GPS meter would update the schedule of fees daily (or more frequently in the case of dynamically priced roads) over the cell phone, wireless internet, or other wireless network. When a specially equipped gasoline pump nozzle is inserted into the car, the GPS meter transmits to the pump how much money the motorist owes to each of the owners of highways, roads, and streets the car used since the last fill-up. The motorist pays this amount in lieu of a traditional cents-per-gallon gas tax.

During travel, the GPS devices are likely to offer real-time information on how much motorists are spending to drive on particular roads. Prior to travel, motorists could consult their computers or GPS devices to find the cost of particular routes, including alternative routes or times that may cost less.

This system can preserve traveler privacy because the only information transmitted to the gas pump is the total cost of road usage per roadway owner (e.g., state, locality, private provider), not when or which roads were actually used. It can also preserve verifiability because motorists who believe charges are inaccurate can call upon more detailed records in their GPS device to prove how much travel their cars have done. When motorists are satisfied charges are fair, they can erase the more detailed data on the GPS at any time so no one can acquire those records.

Oregon's plan isn't the only model for the way the system could work. The Oregon system requires that all road prices be stored in and regularly updated to each vehicle's GPS meter. At the opposite extreme, the Intelligent Transport Society for the United Kingdom published a 2007 paper describing a system in which each vehicle's GPS would only track the vehicle's position and communicate that position to a central computer that calculates charges.[25] This system might have lower initial costs but be more invasive of people's privacy.

Intermediate systems have been proposed that could protect privacy without requiring GPS meters to store complete road pricing information. In 2008 a company called Skymeter proposed an alternative system in which all vehicles communicate wirelessly with private "network tolling operators." The operators would calculate the charges but would not retain personal routes and travel times, thus avoiding privacy threats while minimizing the need for GPS meters to store and update road charges.[26]

Fears that GPS meters capable of storing complete road price information would be costly seem unwarranted. Computer processing power and data storage technology have advanced dramatically in recent years, increasing capability while reducing cost. Today's smart phones have more processing power and on-board memory than most desktop computers had when the above two papers were written. Supermarkets sell 4-gigabyte memory sticks for $5, and many new automobiles have more on-board processing power than a Boeing 787 (not counting the plane's entertainment systems).[27] Even on the fastest-possible timetables, by the time states begin to implement vehicle-mile fees, the cost of GPS meters capable of storing and regularly updating schedules of road charges will be trivial.

Vehicle-mile fees would have the added advantage of putting the various owners of roads in competition with one another. City, county, and state road departments and private road owners would have incentives to build, maintain, and operate their roads as efficiently as possible to keep road charges competitive with those of other road owners. They would also have incentives to keep the roads in good condition to make them attractive to users.

This system would work for all vehicles that use liquid or gas fuels. As for electricity-powered vehicles, fees could be collected in one of two ways. Currently, while the number of such vehicles is small, they could make periodic reports of road use over the cell-phone network. Owners would then be billed or have fees charged to a credit card. If in the future the number of electric vehicles becomes large, states could bill owners directly through the electrical network that charges the vehicle so that when the car is plugged in it transmits its road use fees through the electrical grid the same way that a petroleum-fueled car would transmit at the pump. This latter sys-

Even on the fastest-possible timetables, by the time states implement vehicle-mile fees, the cost of GPS meters capable of storing and regularly updating schedules of road charges will be trivial.

tem would be more easily enforced but would require a capital investment that might not be justified for the currently small number of electric vehicles on the road.

States should introduce vehicle-mile fees in a revenue-neutral manner. Gasoline taxes as well as income, sales, and property taxes that are spent on roads should all be repealed. At least initially, total collections from vehicle-mile fees would be about the same as total taxes now collected for roads. Individual road users may see their costs go up or down depending on whether they tend to use roads that are more or less expensive than average per vehicle-mile. For example, an urban freeway may be expensive to build and maintain, but if it receives heavy use it may cost less, per vehicle-mile, than a little-used rural road.

Under this system, users would nominally pay for the roads they actually use. However, there may be times when road providers find it optimal to cross-subsidize roads. For example, today some toll road authorities have used the tolls collected from the highways to build additional roads that are untolled but that help feed motorists on and off their toll roads. The same rationale might be appropriate under a mile-fee system. It would be up to the owners of the various state, county, city, and private highway systems to decide if and how much they would want to cross-subsidize little-used roads in their systems with revenues from other roads.

Redesigning Highway Agencies

From the 1920s through the 1970s, state highway agencies were funded almost exclusively from gas taxes, tolls, and other user fees.[28] The agencies' budgets were approved by state legislatures with little debate and few or no earmarks. The agencies maintained roads and built new ones as needed on the basis of use and demand. Starting in the 1980s, and earlier in some states, roadway provision became more political as gas taxes fell short of highway needs, transit agencies and other special interests lobbied for diversions of gas taxes to their programs, and federal and state earmarks or mandates for particular projects that were not necessarily cost-effective became common.

Today, the most independent highway agencies are county toll-road authorities in Florida, Texas, and other states that rely solely on their own funding for operations. Replacement of gas taxes with vehicle-mile fees should be accompanied by a restructuring of state and local highway agencies into quasi-independent authorities, similar to the Florida and Texas toll-road authorities that function using their own revenues and receive little political oversight other than what is needed to avoid corruption.

Many places have parallel city, county, and state roads, offering a competitive system. As drivers use their GPS devices to find alternative routes that offer the swiftest travel and/or the lowest cost, they will effectively put pressure on road agencies to be as efficient as possible in order to capture motorists' business. This competition will also stimulate the construction of private roads. Most new highways in Europe are built through public-private partnerships in which the public agencies do little more than offer a franchise and, perhaps, right of way while private companies risk their money to build and maintain the road in the hope of profiting from road fees.

Vehicle-mile fees would make it technically easy for residents of individual neighborhoods to take control of their streets from the municipality. Neighborhood associations could collect fees from people driving on their streets and use the money for street maintenance and occasional repaving.

Some people resist the idea of private roads, fearing that private owners would charge higher tolls and fail to maintain the roads.[29] For these reasons, the U.S. Senate recently approved a bill aimed at discouraging states from leasing toll roads to private operators.[30] Under the competitive system described here, however, private as well as public road providers would have incentives to manage roads to be as physically and economically attractive as possible.

Many places have parallel city, county, and state roads, creating a competitive system that will effectively put pressure on road agencies to be as efficient as possible.

Many states' constitutions limit the use of gas tax revenues to building, maintaining, and operating highways, roads, and streets. Road users may want to take similar precautions for vehicle-mile fee revenues to ensure that those revenues are not siphoned into state general funds or spent on gold-plated transit projects that provide little or no transportation benefits. In a truly competitive system, with state, county, city, and even private parallel routes, such precautions may be less necessary as the road agencies will have incentives to keep prices competitive.

Technical Implementation and Costs

Rapid implementation will more readily solve both highway finance and congestion problems.

States could either implement vehicle-mile fees rapidly or phase them in over several years:

- Rapid implementation would require that mileage fees completely replace gas taxes on a certain date, say, January 1, 2015. By that date, states or gasoline dealers would install devices capable of reading on-board GPS meters in all gas pumps and auto owners should install GPS meters in all motor vehicles.
- A slower implementation would initially require only that new motor vehicles have GPS meters. Cars without GPS meters would continue to pay gasoline taxes. States would endeavor to install meter readers on all gasoline pumps, but if some stations miss the deadline, cars would simply pay gas taxes when using those pumps. The American auto fleet turns over about every 18 years, by which time most all vehicles would be covered by a federal mandate that all new vehicles have GPS meters.

The slower alternative might be more politically acceptable, but given the rapid decline in gas tax revenues that is projected on the basis of slowed growth in driving combined with increasingly fuel-efficient cars, the faster implementation is preferred as it would more readily solve both finance and congestion problems. In addition, the slower alternative might create tensions as, for a time, some people would pay fees along with any gasoline or general taxes used to subsidize local roads for those who aren't paying the fees.

The costs of implementing a mileage-fee system should be low. Oregon spent nearly $400 manufacturing and installing prototype GPS devices on each test car, but it has been estimated that if the units were mass produced, costs could drop to around $100 per car (though costs would be higher if owners want mapping and other GPS functions included). Auto owners would pay this cost, though low-income owners might receive state assistance. Oregon spent about $300 per pump converting gasoline pumps to read the GPS devices, and this cost should also decline with widespread implementation. This cost would be paid by the states under the "slow" plan or by either the states or the fuel dealers under the "fast" plan. Once those capital investments are made, collection costs are comparable to those for gasoline taxes.

Institutional Implementation

The main obstacle to implementing vehicle-mile fees is that there are so many jurisdictions involved, including the federal government, 50 states, and all the local governments (including the District of Columbia) that subsidize roads out of general funds. Complete conversion from gas taxes to vehicle-mile fees requires the following three steps:

1. The American Association of State Highway and Transportation Officials (AASHTO) should establish uniform standards for vehicle-mile fees. This does not mean that states all need to adopt exactly the same technologies, but the technologies they do adopt should be able to function in every other state.
2. Congress should phase out the federal gasoline tax over a 6-year period under

the rapid-implementation plan, or 18 years under the slow plan. This could be done in a way that rewards states for replacing their gas taxes with vehicle-mile fees, for example, by giving the first states to implement such fees a slightly higher share of federal gas taxes while those gas taxes are still being collected.

3. Individual state legislatures could implement either the fast or slow plan at their discretion. As they do so, they should invite local governments to join in but make the elimination of subsidies out of general funds a condition for joining. States should also dedicate all vehicle-mile fees to the road networks that generated those fees and not divert any to transit or other uses.

These steps need not be taken in any particular order. Individual states could implement vehicle-mile fees before any federal action or adoption of AASHTO standards. Though doing so might risk incompatibility with any standards later adopted, it may be that AASHTO won't bother to adopt standards until at least a few states have passed legislation replacing gas taxes with mileage fees. AASHTO could (and should) adopt standards without waiting for Congress to begin phasing out federal gas taxes, but no harm would be done if it does not. Meanwhile, Congress could keep collecting federal gas taxes after the states have converted to vehicle-mile fees.

Social Effects

Mobility has an important value, and the greatest benefit of a vehicle-mile fee system is that it can easily be used to eliminate congestion. This in turn would greatly enhance the mobility of the large numbers of people who need to travel during the busy periods of the day.

If gas taxes and other taxes used to pay for roads today are eliminated when vehicle-mile fees are instituted, the transition should be revenue-neutral. However, most individual drivers are likely to pay more in vehicle-mile fees than they previously paid in gas taxes to account for the $30 billion in subsidies now going to roads. This may have a small effect on driving habits.

A larger effect is likely to result from an end to any cross-subsidies that now exist in highway finance. Urban roads are so much more heavily used than rural roads, for example, that it is likely that urban drivers pay more in gas taxes than it costs to maintain their roads while rural drivers pay less. Requiring people to pay for the roads they actually use could affect rural residents more than urban ones. By increasing the cost of living in rural and suburban areas, vehicle-mile fees may reduce urban sprawl without all the negative consequences of urban-growth boundaries, which include unaffordable housing and increased traffic congestion.[31]

While a true user fee is by definition more equitable than today's system that relies on various subsidies and cross-subsidies, new funding proposals inevitably lead people to ask how they would affect low-income families. To the extent that low-income drivers own older, less-fuel-efficient cars, some could actually end up paying less in vehicle-mile fees than gas taxes. In general, however, asking people to pay for the roads they actually use is no more unfair to low-income people than asking people to pay more for filet mignon than for hamburger. Vehicle-mile road pricing's effect on congestion would disproportionately benefit low-income workers, who generally have less choice over job locations and commute times than middle- and high-income commuters.

Some may worry that funding roads out of vehicle-mile fees rather than gas taxes could reduce the incentive to drive more fuel-efficient cars. While high fuel prices should be enough of an incentive for people to buy more fuel-efficient cars, road providers may find that lightweight (and therefore more fuel-efficient) cars cause less wear and tear on roads than heavier vehicles, and could offer discounts to owners of such cars. In gen-

Vehicle-mile fees may reduce urban sprawl without all the negative consequences of urban-growth boundaries, such as unaffordable housing and increased traffic congestion.

To save motorists more than $100 billion a year in congestion costs and local governments $30 billion a year in road subsidies, Congress and the states should take action as soon as possible.

eral, however, advocates of using tax policy to promote fuel economy would do better to address this through tax credits for new-car purchases rather than through the gas tax.

Benefits

Replacing gas taxes with vehicle-mile fees would save more than $100 billion a year by reducing congestion, relieve local governments of the need to find $30 billion a year in general funds to support roads, and make road providers more responsive to users because the providers would depend on users, rather than politicians, for revenues. This change would also greatly reduce the tendency for Congress and state legislatures to spend transportation funds inefficiently as pork.

To achieve these benefits as rapidly as possible, Congress, the states, and AASHTO should all take action soon. In particular, Congress should begin to phase out federal gas taxes, AASHTO should write standards that would allow state-prescribed GPS meters to work in other states, and individual state legislatures should set target dates for complete conversion from gas taxes to vehicle-mile fees in their states.

Notes

1. David Schrank, Tim Lomax, and Bill Eisele, "TTI's 2011 Urban Mobility Report," Texas Transportation Institute, College Station, Texas, 2011, p. 1.

2. Rémy Prud'homme and Chang-Woon Lee, "Size, Sprawl, Speed and the Efficiency of Cities," *Urban Studies* 36, no. 11 (October 1999): 1849–58; Robert Cervero, "Efficient Urbanization: Economic Performance and the Shape of the Metropolis," *Urban Studies* 38, no. 10 (2001): 1651–71.

3. Shunan Xu, "Development and Test of Dynamic Congestion Pricing Model" (master's thesis, MIT, 2009), p. 15, tinyurl.com/7fhld7q.

4. Petros Ieromonachou, "Urban Toll Rings: What Lessons Can We Learn from the Norwegians?" *Traffic Engineering and Control* 47, no. 8 (August 2006): 310–14.

5. David LeCoffre, "Variable Tolls in France," presentation given at International Symposium on Road Pricing, Key Biscayne, Florida, November 20, 2003, pp. 12–17, tinyurl.com/6ssklzh.

6. "Tolls in Florida," Cost of Tolls, 2012, tinyurl.com/7qslfva.

7. Highway construction price indexes increased by six times between 1970 and 2006; see tinyurl.com/7ae7sga. Unfortunately, these are not available before 1970, but they track very closely with Census Bureau home construction price indexes, which increased nearly nine times between 1964 and 2006; see tinyurl.com/7rzqshy. Adding the change in the Consumer Price Index between 1956 and 1964 brings 2006 costs to 10.9 times 1956 costs; see tinyurl.com/334qxh. Due to the recession, costs have declined since 2006, but they are likely to rise again as the economy recovers.

8. Federal Highway Administration, *Highway Statistics 1956* (Washington: Federal Highway Administration, 1957), Table VM-1; Federal Highway Administration, *Highway Statistics 2009* (Washington: Federal Highway Administration, 2010), Table VM-1.

9. Ibid.

10. Federal Highway Administration, *Highway Statistics 2006* (Washington: Federal Highway Administration, 2007), Table HF-10.

11. Robert L. Reid, "The Infrastructure Crisis," American Society of Civil Engineers, 2008, tinyurl.com/89wot75.

12. Bureau of Transportation Statistics, *National Transportation Statistics* (Washington: Bureau of Transportation Statistics, 2012), Table 1-28, tinyurl.com/6txw7eq; Federal Highway Administration, "Count of Bridges by Structure Type, 2011," 2012, tinyurl.com/788vx3p.

13. Federal Highway Administration, "Bridges by Owner, 2011," 2012, tinyurl.com/82hr2us.

14. Federal Highway Administration, *Highway Statistics Summary to 1995*, Table VM-201,tinyurl.com/7f25a83; Federal Highway Administration, "Traffic Volume Trends, December 2011," tinyurl.com/7a3cypo.

15. Environmental Protection Agency, "1970–2011 Average Annual Emissions, All Criteria Pollutants," 2011, tinyurl.com/6rhhta8. Reductions by pollutant are: carbon monoxide: 79.7%; nitrogen oxides: 71.2%; particulates (PM10): 80.3%; sulfur dioxide: 88.4%; volatile organic compounds: 82.6%; lead: 99.99%.

16. U.S. Department of Transportation, "Traffic

Fatalities in 2010 Drop to Lowest Level in Recorded History," April 1, 2011, tinyurl.com/4y25t5y.

17. Revised Code of Washington 47.01.440(1)(c).

18. See, for example, Reid Ewing et al., *Growing Cooler: The Evidence on Urban Development and Climate Change* (Washington: Urban Land Institute, 2008), p. 1.

19. Randal O'Toole, "Does Rail Transit Save Energy or Reduce Greenhouse Gas Emissions?" Cato Institute Policy Analysis no. 615, April 14, 2008, p. 4.

20. Ibid., p. 8.

21. Martha J. Bianco and Sy Adler, "The Politics of Implementation: Oregon's Statewide Transportation Planning Rule—What's Been Accomplished and How," Portland State University Center for Urban Studies Discussion Paper 98-8, November, 1998, p. 4, tinyurl.com/7hxatg3.

22. Beth Slovic, "Why Can't Portland Repave Its Rutted Roads?" *The Oregonian*, February 26, 2012, tinyurl.com/848ff3d.

23. Federal Transit Administration, "Notice of Proposed Rulemaking: Major Capital Investment Projects," *Federal Register*, January 25, 2012, pp. 3848–3909.

24. Randal O'Toole, "Comments on Notice of Proposed Rulemaking: Major Capital Investment Projects," Cato Institute, March 5, 2012, p. 2, tinyurl.com/894lz3b.

25. Intelligent Transport Society (UK) Road User Charging Interest Group, "White Paper: Technology Options for Road User Charging in the UK," December 2007, tinyurl.com/7hxoxce.

26. Bern Gersh and Gabriel Roth, "Paying for Roads in the 21st Century with TDP Pricing," Paper presented at the 88th annual meeting of the Transportation Research Board, Washington, November 13, 2008, tinyurl.com/lwlhnn.

27. Robert N. Charette, "This Car Runs on Code," *IEEE Spectrum*, February, 2009, tinyurl.com/apd5lq.

28. Federal Highway Administration, *Highway Statistics Summary Through 1995* (Washington: Federal Highway Administration, 1996), Table HF-210.

29. Matt Sledge, "Highway Bill Could Dampen Market for Long-Term Leases, Like Indiana Toll Road," *Huffington Post*, February 9, 2012.

30. Matt Sledge, "Senate Transportation Bill Passes with Bipartisan Support," *Huffington Post*, March 14, 2012.

31. Alex Anas and Hyok-Joo Rhee, "Curbing Excess Sprawl with Congestion Tolls and Urban Boundaries," *Regional Science and Urban Economics* 36, no. 4 (July 2006): 510.

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