Proposal 9: Funding Transportation Infrastructure with User Fees

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Deficit Reduction (10-year): **$312 billion**

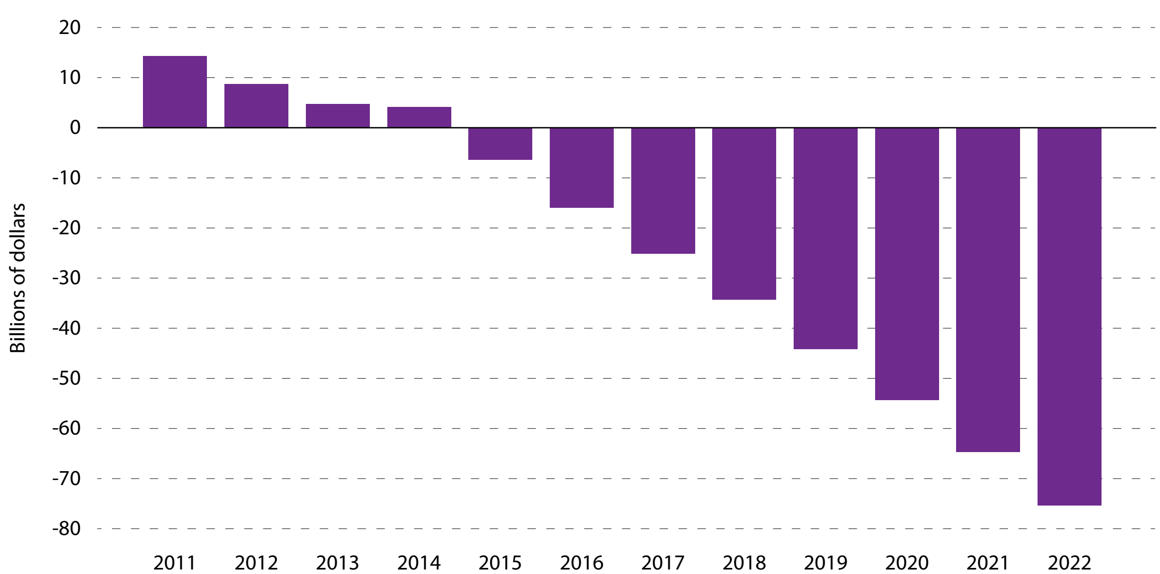
Broader Benefits: **Raises revenues, reduces congestion on major roadways, reduces pollution; promotes wiser infrastructure investments.**

Introduction

Federal surface transportation programs are intended to improve the quality, utility, and productivity of the surface transportation system by enhancing the system's safety (e.g., achieving reduced vehicle crashes, including fatalities) and operating performance (e.g., reducing congestion, increasing freight throughput, etc.); and by reducing the environmental impact of surface transportation. Although federal transportation spending is less than 2 percent of the overall federal budget, that spending—like spending in the rest of the budget—is currently on a collision course with reality. Unlike most federal programs, the federal surface transportation program has historically been funded by dedicated taxes on gasoline, diesel, and other transportation-related taxes. These taxes are deposited into the Federal Highway Trust Fund and

FIGURE 9-1.

Highway Trust Fund Projections



Source: CBO 2012.

then invested in roads, bridges, transit systems, and a variety of other surface transportation projects through state and local governments.

After being replenished by the general fund multiple times in recent years (adding billions to the federal deficit in the process), however, the Highway Trust Fund (the Fund) is currently projected to go negative again in 2015, with the negative balance growing rapidly each year after that (figure 9-1).

The 2012 federal surface transportation legislation Moving Ahead for Progress in the 21st Century Act (MAP-21) bought several years of solvency in the Fund, but did not address the long-term trajectory of the program. Going forward, it is undisputed in transportation policy circles that a new approach will be needed to sustainably fund surface transportation in the United States. The key questions that remain unanswered are these: How do we balance a looming near-term funding cliff with the long lead times associated with funding reforms that are more fundamental? And what role does the revenue policy choice play in improving transportation performance outcomes, particularly as it relates to congestion levels? If one accepts the premise that continued deficit spending to fund surface transportation projects is undesirable (some would argue this point), there are two distinct near-term options: (1) reduce federal spending to match revenues, or (2) adjust certain federal taxes in the near term. Given the growing costs to rehabilitate, maintain, and operate existing surface transportation, some experts express concern that state and local governments would not increase their own investments to fill the gap left by a shrinking federal program. Today, forty states rely on the federal government for more than 25 percent of their transportation funding.

Revenue options begin to expand when we look beyond the next two years, however. One approach that has been implemented relatively narrowly in the United States but that has achieved success in other countries is a direct road-pricing system where motorists pay fees directly to drive on certain roads (as opposed to paying taxes indirectly as they do today), potentially combined with some form of dedicated local taxes tied to specific transit projects. Economists from all backgrounds have strongly supported some form of direct pricing for roads, similar to the way other utilities are priced. In fact, Nobel Prize–winning economist William Vickrey proposed a specific road-pricing system to reduce congestion in Washington, DC, as far back as 1959 and in the New York City subway system in 1952. Vickrey said, "You're not reducing traffic flow, you're increasing it, because traffic is spread more evenly over time. . . . People see it as a tax increase, which I think is a gut reaction. When motorists' time is considered, it's really a savings" (quoted in Trimel 1996).

According to the U.S. Department of Transportation, an effective road-pricing system—once fully implemented—could generate between $38 billion and $55 billion annually in revenue while simultaneously reducing road congestion and reducing environmental impacts (U.S. Department of Transportation 2008a). Singapore's broad use of fully electronic road pricing is one of the key reasons the World Bank perennially ranks it number one in the world in terms of logistics performance. With a population of more than 5 million and only 250 square miles of land, Singapore's transportation system achieves free flow speeds on its expressways and arterials every day. Indeed, the key strength of such a solution is not only that it raises revenue to support surface transportation investments and operations, but also that it does so in a way that confers additional benefits including reduced congestion and pollution.

The Challenge

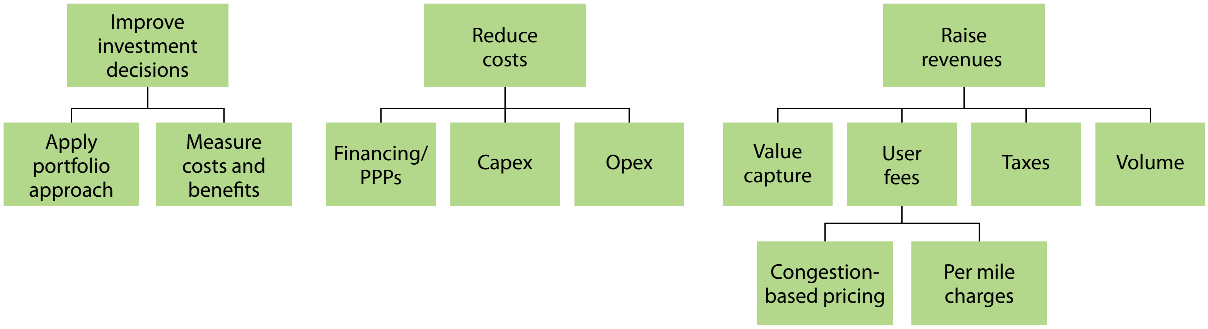
Three primary levers are available to the federal government, as well as to state and local governments in their comparable struggles to achieve fiscally sustainable approaches to transportation (figure 9-2). Often, the debate swirls solely around the revenue lever, but evidence suggests that the other levers can be quite powerful. In particular, reducing the costs of road construction and operation, as well as improving infrastructure investment decisions, are potentially as important as increasing revenues. For instance, in previous Hamilton Project papers, Eduardo Engel, Alexander Galetovic, and Ronald Fischer (2011) discussed how effective private-public partnerships for infrastructure financing can significantly reduce government costs; and David Levinson and Matthew Kahn (2011) proposed a new, more-efficient system for investing in infrastructure projects. A just-released report from McKinsey Global Institute estimates that the global infrastructure need could be reduced by 40 percent by adopting more-sophisticated approaches to selection, delivery, and operations of infrastructure systems, including surface transportation (Dobbs et al. 2013). Given how large the U.S. surface transportation system is already, it is likely that the U.S. figure is even higher than that global figure. While national policy in these areas can be quite important, state and local governments control nonrevenue decisions even more directly.

REVENUE BASELINES

In recent years, the U.S. Department of Transportation and two national commissions have looked at the question of transportation revenues to assess national investment levels necessary to maintain or improve existing conditions or performance of surface transportation systems (National

FIGURE 9-2.

Three Critical Levers Can Be Used to Close the Deficit



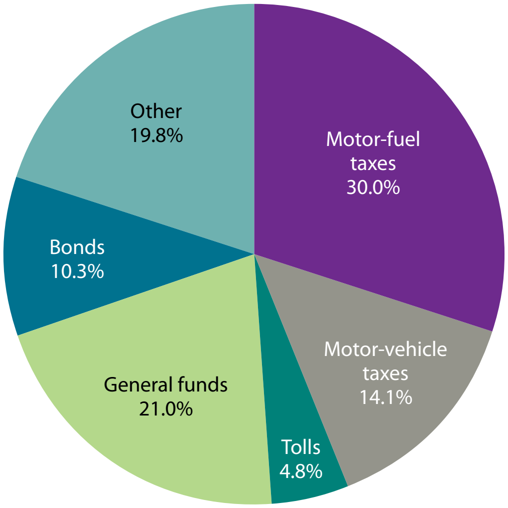
Surface Transportation Infrastructure Financial Commission 2009; National Surface Transportation Policy and Revenue Study Commission 2007; U.S. Department of Transportation 2008b).[1] The numbers from these sources coalesce around a cost-beneficial capital investment level of approximately $200 billion annually at the federal, state, and local levels of government. Currently, federal investment is approximately $52 billion per year ($40.7 billion specified for highways and $11.7 billion for transit). Maintaining the historic federal role (a debatable assumption) of approximately 40 to 45 percent of all surface transportation capital investments would imply substantial increases over the $52 billion. After the passage of MAP-21, the United States cannot maintain even existing investment levels with current revenue absent a substantial increase in state and local investment levels.

The Highway Trust Fund—which has no deficit spending authority—would experience a shortfall of $110 billion between 2015 and 2022, leading to dramatic program cuts or massive requirements from the already strapped general fund. Using gas and diesel taxes as the only federal revenue option to fill this gap would imply an $0.08 per gallon (or approximately 40 percent) increase in both taxes.

Taxes on gasoline and diesel fuel have been a relatively predictable and powerful revenue generator for many years, providing the foundation for the buildout of the interstate highway system—widely considered one of the seminal economic investments of the twentieth century. More than 90 percent of federal revenues for transportation historically came from fuel taxes until the recent general fund transfers.

FIGURE 9-3A.

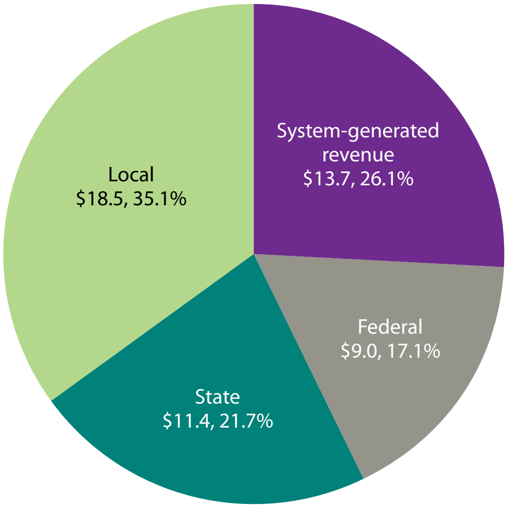
Revenue Sources for Highways, 2008



Source: U.S. Department of Transportation 2010.

FIGURE 9-3B.

Public Transit Revenue Sources, 2008



Source: U.S. Department of Transportation 2010.

TABLE 9-1.

Marginal External Cost of Driving in Major U.S. Cities

City	Total annual hours of delay	Marginal external congestion cost (cents/mile)
Los Angeles	490,552	32.4
New York	384,046	31.7
Chicago	202,835	33.7
Dallas	152,129	25.9
Miami	150,146	28.7

Source: Parry 2008.

State and local governments, on the other hand, rely increasingly on nonfuel tax revenue streams. In fact, fuel taxes nationally make up only approximately 30 percent of the total revenues for highway investment. On the rail and bus transit side, revenue sources are even more disconnected from users, with only 26 percent of revenues generated nationally from the system itself (figures 9-3a and 9-3b). According to the nonpartisan Congressional Budget Office ([CBO] 2012), the advent of corporate average fuel economy (CAFE) standards and alternative fuel vehicles will further erode fuel tax revenues by 21 percent by 2040. In the decade between 2012 and 2022, the CBO estimates that CAFE will reduce Highway Trust Fund revenues by $57 billion.

Even more important than vehicle-related shifts away from gasoline and diesel taxes, however, is the fact that indirect taxes send very weak signals to drivers about the true costs of using roads. This is particularly problematic in urbanized areas. Roads in urbanized areas make up 27 percent of total road miles, but 67 percent of all miles traveled, according to the "2010 Conditions and Performance Report" (U.S. Department of Transportation 2010). The marginal social costs of driving on urbanized roads is substantially higher than it is on nonurban roads. In other words, the costs that a driver on an urbanized highway during rush hour imposes on the public is substantially higher than the costs an off-peak driver on a lightly traveled rural road imposes. Today, that driver internalizes her own delay costs and whatever other taxes she pays. For the most-congested roads in the United States, the true costs per mile (including congestion and unreliability costs) of driving can be ten to twenty times higher than current taxes (table 9-1).

Some have argued that it would be easier to simply raise gas and diesel taxes to levels closer to the true marginal cost. This would result in substantial overtaxation, however, because that step would generally not reflect the dynamic nature in which these costs are imposed. For example, delay, unreliability, and environmental costs on a major urban beltway at 8:30 a.m. are significantly different from travel costs for the same vehicle on the same highway at 2:00 a.m. An effective charging system in the future would ideally be capable of accommodating these cost differentials in some form.[2] In order to foster a discussion about potential solutions that address this surface transportation investment gap, the American Association of State Highway and Transportation Officials (AASHTO) organized a matrix of revenue options, as shown in table 9-2.

The National Surface Transportation Infrastructure Financing Commission scored each of these potential revenue raisers based on size of revenue stream, economic efficiency and impact, implementation/administration costs, and social equity considerations (National Surface Transportation Infrastructure Financing Commission 2009). With the exception of raising gas taxes (a conversion of the current gas tax to a sales tax would represent a tax increase) or implementing a dedicated income tax—both of which are highly unpopular proposals—none of the other existing policy mechanisms, on its own, would generate sufficient revenue streams to ensure the solvency of the Highway Trust Fund, unless the taxes imposed represented very large increases over existing levels. In other words, small marginal increases of the vast majority of transportation-related taxes would likely be insufficient to maintain current spending levels. Perhaps it is unsurprising, then, that a solution to a highly foreseeable significant gap between revenues and spending has eluded the current process.

As a national transportation strategy matter, these options also suffer from a variety of shortcomings. Any indirect tax, whether on gasoline, income, tires, automobiles, or driver's licenses, can solve for only one side of the supply and demand equation. More revenues can help recapitalize existing assets and build new capacity, but none of the revenues listed above has the ability to reflect the actual costs of driving. In other words, none of the revenue streams listed above will work to sustainably reduce congestion—a problem that continues to

TABLE 9-2.

Surface Transportation Revenue Options

Surface Transportation Revenue Options (all revenue estimates in millions of dollars)		
Funding Mechanisms	**Illustrative Rate**	**Total Revenues**
Container tax	$15.00	$ 41,361
Customs revenues (partial dedication)	1.0%	$2,451
Drivers license surcharge (Annual)	$5.00	$6,926
Excise tax on diesel (increase and indexing)	$0.15	$45,060
Excise tax on gas (increase and indexing)	$0.10	$94,505
Freight bill – all modes	1.0%	$55,415
Heavy vehicle use tax (increase)	15.0%	$977
Imported oil tax	$1.00	$21,171
Registration fee on light duty vehicles (annual)	$10.00	$16,387
Registration fee on trucks (annual)	$15.00	$797
Sales tax on fuel – diesel	10.6%	$79,555
Sales tax on fuel – gas	8.4%	$236,605
Sales tax on trucks and trailers (increase)	5.0%	$10,062
Tire tax on light duty vehicles	$3.00	$36,870
Truck tire tax (increase)	10.0%	$326

Source: National Surface Transportation Infrastructure Financing Commission 2009

plague most of our urbanized areas and is projected to worsen in the future.

Interestingly, without any sort of national policy consensus, the battle for the future transportation revenue stream is already well under way at the state and local levels. Between 2000 and 2008, taxes on motor fuel and motor vehicles for all levels of government grew at just 1.5 percent per year compared to strong growth in toll revenues (6.2 percent annual growth), general fund appropriations (9.7 percent annual growth), and borrowing (7.4 percent annual growth). The share of total revenues for motor vehicle and motor fuel taxes fell from 58 percent of total highway revenues in 2000 to just 44 percent in 2008 (U.S. Department of Transportation 2010).

From the perspective of the broader U.S. economy, reducing congestion is particularly important, as our metropolitan areas are more critical than ever to our growth potential. In fact, a recent paper published by the McKinsey Global Institute (Dobbs et al. 2012) shows that the United States is even more dependent on cities than is China or Western Europe. About 85 percent of U.S. GDP is generated in cities with more than 150,000 inhabitants, compared to 78 percent of GDP in China and 65 percent of GDP in Western Europe (Dobbs et al. 2012). This means that transportation revenue strategies have clear national economic policy implications. In resolving both near- and longer-term funding issues, therefore, a focus on proposals that not only are capable of generating sufficient revenue, but also that reduce congestion and entail other social and economic benefits, would seem warranted.

A New Approach

The most direct form of transportation revenue is a charge to use a specified facility. In the highway world, it is called a toll. In the transit world, it is called a fare. In the airline world, it is called a ticket price. As of this writing, the scramble for revenue streams has picked up pace, and technology to enable road authorities to charge directly for facility use with little or no impact to travel speeds (that is, without toll booths) has emerged. In the past five years, roads that do not require drivers to slow down at different charging points (open-road tolling) have opened in California, Colorado, Florida, Georgia, Minnesota, Texas, Utah, Virginia, and Washington State. Although there are different technologies, rules, implementation approaches, and lane configurations under each of these examples, there are several common themes.

First, prices are set and work to maintain freeflow conditions on the priced lanes at all times. In other words, the level of service that was hoped for has been achieved and drivers have been responsive to the price signals they receive. This is not to say all projects have seen smooth openings. In Atlanta, for example, problems with structure of the pricing algorithm created the perverse effect of worsening congestion in unpriced lanes. This was corrected relatively quickly, however. In Miami, safety was initially a concern because some drivers were confused about the structure and others attempted to move between priced and unpriced lanes at incorrect points. This, too, has been addressed.

Second, users of these roads have had overwhelmingly positive things to say about their experience. Surveys of users of these roads routinely reveal approval ratings in excess of 70 percent and in some cases well over 80 percent. It appears that speed, reliability, and better lighting are indeed features that appeal to drivers if they are given the ability to exercise these preferences in exchange for a price. A fundamental failure of the current model is that it does not recognize the diversity of preferences people have for different attributes of travel. Not only are people's preferences quite different, but also their own preferences vary significantly from day to day. This is somewhat intuitive, but a variety of works by Cliff Winston and colleagues from Brookings have validated this (Calfee and Winston 1998; Calfee, Winston, and Stempski 2001; Small, Winston, and Yan 2005).

Third, the collateral benefits to bus travel can be an important factor in the overall benefits of priced roads. Higher speed and more-reliable buses will increase demand for bus trips, which in turn reduces the price needed to balance supply and demand. In fact, a number of federal highway research projects have shown that a 10 to 14 percent reduction in traffic volumes in a given period can reduce delays by more than 90 percent (U.S. Department of Transportation 2008). This, along with the lower bus operating costs that comes from more-stable travel speeds, creates a virtuous cycle and offers the potential for even-more-aggressive strategies integrating bus travel and road pricing.

Fourth, the revenue streams that emerge from these facilities are a side effect, not the primary reason for the prices. This changes the nature of the public discourse significantly. Leaders can explain these facilities as improving transportation system performance, not first and foremost as a way to increase government spending. The public's cynicism about the degree to which new revenues will simply be wasted on politically popular projects that produce small, if any, net benefits is quite high. As the mayor of London once said to then–Federal Highway Administrator Mary Peters when explaining the public discourse around the congestion charging system in London, "If we had explained it to the public as a revenue raiser, we would have been dead on arrival."

Aside from the obvious time-savings benefits, there are two other critical aspects of direct road pricing. First, relatively small reductions in demand during a given period of time will produce substantially larger increases in travel speeds. Basically, a road reaches a tipping point in its ability to handle volumes (approximately 1,900 vehicles per lane per hour). When that tipping point is reached, traffic speeds rapidly deteriorate, but when volumes are reduced to right below that tipping point, speeds can approximate freeflow conditions. Thus, a small 4–8 percent reduction of traffic may be sufficient to convert a highway from stop-and-go conditions to normal speeds. Second, reliability is valued almost as much as time savings, but most traffic models have had significant difficulty in accounting for these benefits.[3]

There are three basic models of road pricing that are being implemented in the United States and around the world. The first model is areawide pricing systems, where jurisdictions charge drivers for movements within specified zones. The London congestion charging system is an example of this model. This system reduced traffic delays by more than 20 percent initially, although prices have not kept up with demand growth, thereby weakening the effect over time. These systems work well to reduce traffic demand and can be adapted to tie charges relatively closely to the actual marginal cost of delay imposed. That said, any system that uses boundaries will be subject to some distortion and inefficiencies as users adjust behaviors based on the boundaries.

The second road-pricing model, called cordon pricing, is where a boundary is established and users are charged a variable fee for crossing the boundary. Subsequent movements within the boundary zone are not then charged again. Like an areawide system, cordon systems can be quite effective at increasing travel speed and reliability. Stockholm has used this approach for seven years, with citizens actually voting by referendum to retain the system—the first and only example of a popular vote tied exclusively to the imposition of congestion charges. Like an areawide system, a cordon system can produce some distortions and inefficiencies because users will perform more trips in the central business district than they would under a pricing system tied directly to actual travel in the downtown area.

The final model is a facility-based charge where variable tolls are imposed on specific facilities in specific corridors for the purposes of increasing travel speeds and reliability. All U.S. examples are this type of model. Many regions are currently analyzing true network approaches that utilize variable pricing along all major travel corridors to some extent, including those in or around Chicago, Dallas, Houston, San Francisco, and Washington, DC, among others.

The time for implementation of these systems can be short when there is political alignment to move ahead. For example, Miami was able to convert one of the most congested stretches of Interstate 95 and create two dynamically priced lanes in less than a year. The key challenge in many jurisdictions is that the lack of familiarity and experience is a major obstacle to achieving political alignment. More than $1 billion in federal incentive grants in 2007 using a similar structure as that used in the Race to the Top education program accelerated this political alignment in each of the jurisdictions awarded funds (Atlanta, Los Angeles, Miami, Minneapolis, San Francisco, and Seattle). The other key challenge is that converting existing unpriced lanes is far more challenging politically than converting existing high-occupancy vehicle lanes or creating new capacity. To the extent it is even physically feasible, adding new capacity can often take up to ten years. The conversion of the Highway 520 bridge in Seattle from an unpriced to a priced facility in 2011 is the first example of such a conversion in the United States.

A variety of studies have been conducted to estimate the amount of annual revenues that would be generated if the country were to adopt a comprehensive approach to congestion charging. For example, in the "2008 Conditions and Performance Report," the U.S. Department of Transportation (2008a) estimated revenue generation between $38 billion and $55 billion. Obviously, the timeframe to ramp up to these levels would depend on the resolution of a variety of policy and political issues, but it is important to note that administrative and technological challenges would not be a primary impediment to a relatively quick conversion process. It is also important to note that state and local governments appear to react quite strongly to relatively small federal incentive grants.

A transition to a direct user charge system can mitigate negative impacts on low-income people, and could be included as part of a transition to a direct user charge system. Such mitigation could take a variety of forms, including enhanced bus transit services in the relevant corridors, travel credits or vouchers, and tiered pricing such that those with lower values of time or reliability could choose to travel at lower speeds. In any event, the impact on low-income drivers in a world with more direct pricing should be evaluated relative to the current transportation system, where congestion, unreliability, and transit investments targeted toward wealthier suburbs all impact low-income people negatively today.

VEHICLE MILES TRAVELED TAX

As the country grapples with the best ways to implement facility-based charges like those described above, a variety of commentators have begun talking about the need for an even more transformational solution in the longer term. Such a solution could take the form of a GPS-based charging system that could render facility-based charges unnecessary. In Germany, for example, a GPS-based charging system for trucks collects more than $5 billion a year and has been in place for more than eight years. Oregon has been studying and piloting a mileage-based user charging system since 2006, although on a small scale.

The Surface Transportation Financing Commission estimated that a $0.09 per mile charge under a mileage-based system would yield revenue levels equivalent to the existing unsustainable gas or diesel tax model (National Surface Transportation Infrastructure Financing Commission 2009). A major potential advantage of a mileage-based charging system over traditional taxes is the flexibility to design into such a system the ability to incorporate differential pricing based on time of day, type of vehicle, and so on. In fact, leaders in Wisconsin recently proposed a shift away from the gas tax to an odometer reading at the time of annual registration—a crude form of tax on vehicle miles traveled. Privacy concerns remain a major issue for systems with tracking that is more direct, even if technical advances have eliminated most risks of improper information disclosure. Despite this growing attention and interest among researchers in this topic, the transition to an efficient new end-state is likely to be slow. As a result, it is realistic to assume that it would take years for a charging system based on cost of vehicle miles traveled to be generating the types of revenues necessary to fully replace current revenue streams.

Conclusion

The United States is clearly undergoing a major shift in thinking about surface transportation revenues. Experiments around the country are yielding tremendous promise for a more efficient and sustainable long-term revenue model. While the pace of change is slower than ideal, the nature of the debate has changed materially in the past ten years. Today, it is no longer rare to hear discussions about costs, benefits, and rates of return when discussing different options. In other words, the question is not exclusively about how much, but also about how. Solutions like direct road pricing that promise multiple benefits simultaneously are likely to receive more attention and analysis in such a world. In a sector of the economy where progress is often measured in decades, not years, this is no small feat.

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Jack Basso joined American Association of State Highway and Transportation Officials (AASHTO) as Chief Operating Officer and Business Development Director in March 2001, overseeing the management of a $60 million nonprofit organization representing the interests of State Departments of Transportation. Prior to joining AASHTO, Basso served as Assistant Secretary for Budget and Programs and as Chief Financial Officer of the U.S. Department of Transportation. Prior to his appointment by President Clinton to that position, he served as Deputy Assistant Secretary for Budget and Programs. Basso's thirty-six years of service as a career official include assignments such as Assistant Director for General Management of the Office of Management and Budget, Deputy Chair for Management of the National Endowment for the Arts, and Director of Fiscal Services for the Federal Highway Administration. Basso currently serves as a board member of the Maryland Transportation Authority.

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Endnotes

1. Assuming existing approaches to construction or reconstruction, limited demand management or other operational efficiencies and materials, and that dollars are invested in a cost-beneficial manner.
2. Gas taxes face the added challenge of being highly unpopular. A 2009 survey by the Tax Foundation found that gas taxes ranked as the most "unfair" state and local tax, ahead of property taxes, sales taxes, and income taxes (Tax Foundation 2009).
3. The latest Urban Mobility Report released by the Texas Transportation Institute (Schrank, Eisele, and Lomax 2012) includes a planning time index showing that for most major U.S. cities a traveler in congested traffic would need to include a time insurance buffer of more than three times the projected time to destination under uncongested traffic conditions.

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