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Future-Proofing Wisconsin's Highway Funding System

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Introduction

Transportation projects in Wisconsin are primarily funded by per-gallon fuel taxes that are not sustainable given increased fuel economy and the move toward electric and hybrid vehicles.

Since 2006, Wisconsin's excise tax on motor vehicle fuel — diesel and gasoline — has been a flat 30.9 cents per gallon. Inflation has taken its toll, and fuel tax revenue is stagnating even as vehicle miles traveled (VMT) increase and the state's population and transportation needs grow. It's increasingly urgent, as a result, that policymakers implement new alternatives.

Wisconsin is currently one of just 15 states that have no toll roads or bridges. Of its neighboring states — Michigan, Illinois, Iowa and Minnesota — only Iowa has no tolling. Wisconsin policymakers have studied the feasibility of tolling or implementing some other form of mileage-based user fees[1], but the Legislature has yet to adopt either policy as a new funding source.

The Long History of the Fuel Tax

The mass-market Ford Model T began production in 1908, with Ford producing 1 million of the vehicles between 1913 and 1927. The $850 price made it the first vehicle affordable to the middle class. The surge in vehicles was soon followed by the first gasoline tax: In 1919, Oregon — which had 103,418 registered automobiles and trucks on its roads by 1920 — imposed a gasoline tax of one cent per gallon "for the repair of the damage done to said highways by such vehicles, machines and engines traveling thereon."

In 1925, Wisconsin implemented a gas tax, becoming one of 35 states with such a tax. By 1932, all states and the District of Columbia had a gas tax, levied at rates ranging from two

cents to seven cents per gallon.[2]

Federal fuel taxes began in 1932 with a one-cent-per-gallon gas tax amid federal funding shortfalls during the Depression. Federal fuel taxes were not dedicated to highways, however, until the Federal-Aid Highway Act of 1956, which launched the Interstate Highway System. That law also created the federal Highway Trust Fund to safeguard these dedicated fuel tax revenues.

As the Interstate system neared completion in the 1970s, Congress did not reduce or repeal federal fuel taxes. Instead, it increased the tax rates and expanded the uses of the revenue, first to other kinds of highways beyond Interstates, then to mass transit and later even to sidewalks and bike trails.

The last increase in the federal gas tax was nearly 30 years ago — on Oct. 1, 1993 — when it was set at 18.4 cents per gallon. It is not indexed to inflation. A dollar in July 2022 had half the buying power of a dollar in October 1993, according to the U.S. Bureau of Labor Statistics' Consumer Price Index Inflation Calculator. Since 2008, Congress has spent far more than the gas tax brings in and has regularly bailed out the Highway Trust Fund from the general fund, most recently in November 2021 when, through the Infrastructure Investment and Jobs Act, $118 billion in general revenue was transferred to the Highway Trust Fund.[3]

Anticipating a revenue problem because of electric vehicles, Wisconsin implemented an annual surcharge for EVs beginning in 2018. Its revenue projects are well short of compensating for the reduction in annual fuel tax revenue that can be expected.

Making matters worse for fuel tax revenues, in recent years federal policies have focused increasingly on eliminating fossil fuel use, including reducing the use of petroleum-fueled vehicles. This will decrease future fuel tax revenues, making them insufficient to fund the future needs of the nation's and Wisconsin's highway transportation infrastructure.

The Biden-Harris Electric Vehicle Charging Action Plan outlines "steps federal agencies are taking to support developing and deploying chargers in American communities across the country."[4] The White House plans "to make half of all new vehicles sold in 2030 zero-emissions vehicles, including battery electric, plug-in hybrid electric, or fuel cell electric vehicles."[5]

Even before this administration, however, the diminishing returns were obvious: Despite the increase in the number of automobiles, fuel efficiency requirements hurt gas tax revenues. Federal Corporate Average Fuel Economy (CAFE) regulations, begun in 1975 after the Arab oil embargo, are aimed at increasing the fuel economy of new cars and light trucks (pickups, vans and SUVs) produced for sale in the United States. Over the years, the fuel economy standards have become ever more stringent.

- For the 1975 model year, data from the federal Environmental Protection Agency (EPA) shows, about 10.2 million vehicles were produced with "real-world" average

fuel economy of 13.1 mpg. "Real-world" means actual driving conditions.
- For the 2019 model year, 16.1 million vehicles were produced, with average fuel economy at 24.9 mpg.
- For the 2020 model year, 13.7 million vehicles were produced, with average fuel economy at 25.4 mpg.[6] (As of publication of this study, the EPA data for the 2021 model year remains preliminary, and COVID-19 and supply chain issues may change figures significantly.[7])

Given the pandemic-related aberration in automotive production in 2020, and likely in 2021, a comparison between 1975 — the first year of CAFE standards — and pre-COVID 2019 figures, therefore, better demonstrates the impact of fuel economy standards: While annual vehicle production for 2019 was almost 58% higher than for 1975, the average mpg was a whopping 90% higher in 2019 than in 1975. Essentially, new cars in 2019 could go twice as far on a gallon of gas as 1975 cars.

The Biden administration is also following through on announced intentions to undo the Trump administration's less-stringent CAFE standards of 2020, which would have taken effect in 2021. The Trump administration's Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule required auto manufacturers to make 1.5% annual mpg increases through 2026, while Obama-era regulations had required a 5% annual increase. Trump administration standards projected a 40.4 mpg new-vehicle fleetwide average by 2026; the Obama-era rule had targeted 54.5 mpg by 2025.

Motorists and trucking companies deserve to see a genuine value proposition in making a major switch in highway funding.

In March 2022, the National Highway Transportation Safety Administration (NHTSA) announced it had finalized CAFE standards for model years 2024-2026: approximately 49 mpg for passenger cars and light trucks in model year 2026, accomplished by increasing fuel economy by 8% annually for model years 2024 and 2025, and 10% annually for model year 2026.[8]

Meanwhile, auto manufacturers continue to increase their focus on hybrid and all-electric vehicles, which use less or no petroleum. This will further affect the revenues generated by taxing fuel even as vehicle miles traveled (VMT) continue to increase.

Not surprisingly, the Congressional Budget Office's July 2021 baseline projection for the Highway Trust Fund estimated that $191 billion in general fund subsidy was needed to maintain current spending levels plus inflation from fiscal years 2022 through 2031.[9] The November 2021 congressional transfer to the Highway Trust Fund is expected to cover estimated revenue shortfalls through at least 2026, but that transfer represents a one-time infusion of funding.

This funding challenge has long been anticipated: In 2005, a special committee of the Transportation Research Board of the National Academies of Sciences concluded that fuel taxes would not remain viable as the primary highway funding source for the 21st century.[10] (The lead author of this study was a member of that committee.)

Congress responded by appointing a National Surface Transportation Infrastructure Financing Commission to consider approaches to longer-term funding for surface transportation. The commission considered many alternatives, concluding that:

- The original users-pay/users-benefit principle should be retained.
- The best way for users to pay would be to charge by the miles driven rather than by the gallons of fuel consumed.

Importantly, the commission recommended that the mileage-based user fees (MBUF) should be the *replacement* for fuel taxes rather than motorists being charged in addition to fuel taxes.[11]

Congress followed up by authorizing federal funding for state departments of transportation (DOTs) to carry out pilot projects in which motorists and truckers operate their vehicles under a simulated MBUF charging mechanism. Most have taken place in western states, plus Minnesota. Nearly all pilot projects in the eastern half of the country have been carried out by The Eastern Transportation Coalition, formerly known as the I-95 Corridor Coalition. This is a partnership of 17 states and the District of Columbia.

As each corridor was finished and reopened to traffic, motorists would pay new per-mile fees *instead* of state gasoline taxes. The system would calculate rebates of the state taxes on fuel the driver used in the corridor. This would demonstrate to people that the new per-mile charge serves as a replacement for the fuel tax.

The program furthest along is Oregon's Road User Fee Pilot Program, begun in 2007. Building on that — and focusing on motorists' privacy concerns — Oregon's Road Usage Charge Pilot Program (RUCPP) was implemented in 2012-'13. In 2015, Oregon's ongoing, voluntary program, OreGO, opened to up to 5,000 people who could opt to pay a per-mile charge instead of the state fuel tax. Revenue was dedicated to highway and bridge purposes. In 2019, OreGO opened to owners of all vehicles getting at least 20 mpg. In 2022, the charge is 1.9 cents per mile. The charge is adjusted to keep pace with increases in fuel tax rates for as long as state fuel taxes remain in effect. During the (likely lengthy) transition period, each vehicle will pay either the state fuel tax or the state road usage charge *but not both.*

Since 2018, Oregon has phased in fuel tax increases that will bring the state fuel tax to 40 cents a gallon by 2024. "Even with the increase, it won't be enough to raise revenue to pay for future road projects," OreGO warns.[12] For drivers of electric vehicles, enrolling in OreGO can save them hundreds of dollars on registration fees; gasoline-powered vehicles in OreGO receive credit for fuel taxes paid at the pump, thereby paying only the road user charge.[13]

This study focuses on a per-mile charge as one way for Wisconsin's policymakers to address the looming highway funding challenge. First, it provides estimates of the likely shrinkage of fuel sales through 2050. Then it discusses the general lack of awareness among

some policymakers and especially the general public about this challenge and the potential in an alternative that charges road users by the mile. Finally, this study suggests a policy framework for how such a system might be developed and implemented in Wisconsin.

The Predictable Decline in Motor Fuel Use

In recent years, transportation researchers have estimated the likely extent and rate of decline in fuel tax revenues. The estimates of future fuel consumption and fuel tax revenues in this study are based on calculations by transportation consultant Edward J. Regan, a 45-year veteran of revenue forecasting for transportation.

Regan's calculations are based on two national forecasts that are applied to Wisconsin.

- The U.S. Energy Information Administration's (EIA's) projection through 2050 in its 2022 Annual Energy Outlook, including annual estimates of the fuel efficiency of the passenger vehicle fleet as new, high-mpg vehicles are purchased and the older, lower-mpg fleet turns over. This is the basis for projecting estimated gasoline consumption.
- The Bloomberg New Energy Finance (BNEF) global projection of market penetration of electric vehicles (EVs) as new vehicle sales.

Fuel sales in the U.S., including both gasoline and diesel, reached a peak of 190.7 billion gallons in 2019. Travel declined during COVID-19, and 2020 fuel consumption dropped by about 11% to 170 billion gallons. By 2021, fuel sales rose to about 185 billion gallons, a significant recovery from the pandemic impacts of 2020 but still about 3% below 2019 levels.[14]

In effect, the EIA 2022 Annual Energy Outlook projects relatively little growth in U.S. fuel consumption over the next three decades, even though it expects total travel to increase by over 32% during the same period. The result is that by 2050, fuel sales (and fuel tax revenue) will be almost 25% lower than would be expected if there were no change in today's average fuel efficiency and EV share.

The 2022 EIA fuel consumption estimate is slightly higher than the 2021 forecast. This primarily reflects continuing shifts in consumer vehicle choices away from traditional autos to less fuel-efficient SUVs, pickups and the like. The 2022 forecast is probably optimistic, however, because it is based on data through the fall of 2021 and does not yet reflect the higher CAFE standards proceeding under the Biden administration. More importantly, the administration's push for a major shift toward fully electric or plug-in hybrid vehicles is likely to have the greatest negative impact on the nation's future fuel consumption. As such, the EIA 2022 forecast can be expected to underestimate the shift away from internal combustion engines: It anticipates the EV share of the U.S. light vehicle fleet to reach just under 10% by 2050. Recent trends by automakers suggest a more significant shift is on the horizon.

A recent article by Alistair Charlton highlighted the plans of U.S. and worldwide automakers.[15]

- General Motors will have 30 new global electric vehicle models by 2025 and plans

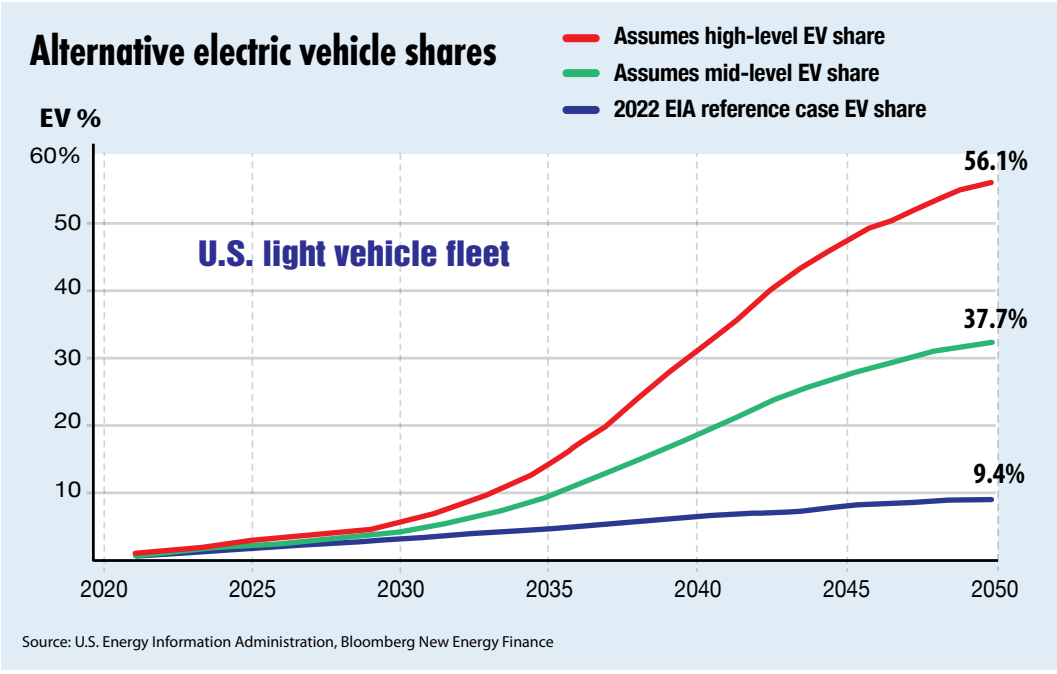
to no longer produce gas-powered vehicles by 2035.
- Ford will sell only EVs in Europe by 2030 and expects 40% of U.S. sales will be EVs by 2030.
- Audi and Fiat will offer only EVs by 2030.
- Volvo will be fully EV by 2030, while Volkswagen plans to be 50% EV by 2030 and fully EV by 2040.
- Hyundai plans to end sales of internal combustion engine vehicles worldwide by 2040.

The EIA assumption for light vehicle EV share is shown in the blue curve in Figure 1. The high-level EV projection, shown in red, is adapted from a 2021 global forecast prepared by Bloomberg New Energy Finance, which estimates the rising EV share of new light vehicle sales. Regan's analysis assumes EV penetration in the U.S. will trail global trends by 10%. Recognizing that the turnover of the vehicle fleet takes many years, it assumes a 10-year gap between the projection for EV shares for new vehicle sales and the share for the overall light vehicle fleet.

In the high-level case, EV share rises significantly after 2030, with the share of battery electric and plug-in hybrid EVs exceeding 50% in the U.S. between 2045 and 2050. Given the wide range of potential outcomes, a third mid-level EV projection was developed, shown in green. This anticipated the EV share will reach about one-third of the light vehicle fleet by 2050.

Despite some level of uncertainty, the effects of the shift to EVs on potential fuel tax revenues undoubtedly will be significant.

Figure 1



Source: U.S. Energy Information Administration, Bloomberg New Energy Finance

Table 1 compares estimates of total fuel tax revenue, including both federal and state levels, for 2050 under four scenarios. With no change in current fuel efficiency or EV fleet shares, 2050 total fuel tax revenue would likely exceed $131 billion.

Table 1

2050 total U.S. fuel tax revenue (Approximate)

(Includes federal and average state fuel taxes)

Scenario	Estimated 2050 annual fuel tax*	Annual revenue impact*	Percent impact
No change in current mpg	$131.6		
2022 EIA reference case forecast	$103.5	-$28.2	-21.4%
With mid-level EV share	$85.8	-$45.8	-34.8%
With high-level EV share	$68.3	-$63.3	-48.1%

* In billions of dollars

NOTE: Annual revenue is based on current fuel tax rates without future increases.

Even with modest EV penetration assumptions, the 2022 EIA reference case forecast shows a reduction in fuel tax revenue of 21.4%. If the nation achieves the high-level EV light vehicle share, a net reduction of 48.1% in revenue can be expected by 2050.

The sustainability of the motor fuel tax as the primary source of the nation's transportation funding is clearly in doubt.

The Looming Decline in Wisconsin's Fuel Use

Wisconsin's state funding for transportation needs largely comes from two sources: motor fuel taxes and registration fees, which account for 89% of state-collected transportation revenue and 54% of total budgeted transportation funds in 2020-'21, according to the Wisconsin Department of Transportation (WisDOT).

As of 2019, the latest data available, there were 3.92 million automobiles registered in the state and 5.16 million total vehicles registered, bringing in a total of $720.1 million in vehicle registration fees. Several fee increases took effect in fiscal year 2020, including a $75 surcharge for all hybrid-electric vehicles. (EV owners have paid a $100 surcharge since 2018.)

For more than a decade, Wisconsin's transportation planners have acknowledged the challenge the state faces in transportation funding due to the growing gap between transportation needs and stagnating fuel tax receipts. The state charges a flat per-gallon tax on gasoline and diesel of 30.9 cents, plus two cents per gallon for the Petroleum Environmental Cleanup Fund Act (PECFA) tackling underground fuel tanks.

From 1985 until 1997, the state had an annual rate adjustment based on inflation and overall fuel consumption.[16] The consumption factor was removed in 1997, and annual adjustments were based on the Consumer Price Index. (In 1989 and 1994, this led to a downward adjustment and a lower gas tax rate.) The CPI adjustment was eliminated starting in 2006. Today, even when gas prices increase, the per-gallon tax remains the same.

Wisconsin's fuel sales, at their strongest in 2018 (3,517 million gallons), declined in 2019

by 1%. Sales plummeted another 3.65% in 2020 over 2019, probably reflecting COVID-19's impact on travel. Fuel sales increased 4.77% in 2021 over 2020 but remained below the 2018 high. Continued declines in fuel tax revenues can be expected.

Not only did the pandemic result in an immediate decline in fuel consumption as offices closed, but it also produced a work-from-home trend likely to continue post-pandemic. In June 2021, Gov. Tony Evers announced the state would offer permanently remote positions to enable government to recruit staff from outside Milwaukee and Madison.[17]

How will Wisconsin make up for the cumulative effect of increased fuel efficiency, the elimination of petroleum as a source of fuel, the decline in work trips and the consequent decline in fuel tax revenues? The state has long grappled with this imminent funding challenge.

Transportation Plans Admitted Unsustainable Funding Stream

In October 2009, WisDOT announced the adoption of *Connections 2030*, the state's long-range multimodal transportation plan.[18] "Achieving a sustainable revenue stream is a challenge. In the near future, Wisconsin's traditional reliance on motor fuel taxes to fund transportation will be tested. … As in other states, Wisconsin's transportation needs have routinely exceeded available dollars," the plan stated.

It added, "Transportation funding should rely on the principal (sic) of user financing. While the fuel tax may not be a viable long-term source of transportation revenue, it is likely to remain the main source of transportation revenues during the next 20 years. … When funding falls short, implementation decisions must consider priorities and trade-offs."[19]

Wisconsin is one of just 15 states that do not toll roads or bridges. Of its neighbors — Michigan, Illinois, Iowa and Minnesota — only Iowa has no tolls. *Connections 2030* highlighted support of the work of the National Surface Transportation Policy and Revenue Study Commission but stressed, "WisDOT does not support the commission's recommendations regarding tolling."[20]

To deal with the anticipated funding shortfall, Wisconsin's Transportation Finance and Policy Commission in 2012 recommended consideration of a one-cent-per-mile mileage-based fee — based on odometer readings — as well as increasing gas taxes, licensing and registration fees.[21]

In December 2021, WisDOT released its final version of *Connect 2050*, replacing *Connections 2030*, and reiterated the goal to "Pursue sustainable long-term transportation funding."[22]

For Wisconsin's 2015-'17 biennial budget, the Legislature's Joint Committee on Finance required a Transportation Fund solvency study.[23] WisDOT examined Transportation Fund revenues and expenditures from state fiscal year 2018 to 2027. Conducted before COVID-19's economic impact hurt revenues, the study forecast almost $28.1 billion in revenue, with worrying shortfalls under each of three scenarios examined:

- Spending *less than* the 2015-'17 budget trend would result in a $850 million budget shortfall and a 109% increase in "poor" state highway miles.
- Spending *the same as* the 2015-'17 budget trend would result in a $3.03 billion shortfall and 93% increase in "poor" state highway miles.
- Spending *above* the 2015-'17 budget trend would result in a $7.94 billion shortfall and 72% increase in "poor" state highway miles.

The study offered three new funding options: a mileage-based motor vehicle registration fee, a highway use fee on new vehicles registered in the state and tolling all or portions of the 875-mile Interstate highway system in Wisconsin. Notably, the authors reported that 940,000 Wisconsin vehicles were already registered to use the Illinois Tollway.

The objective should be not merely to replace the revenue that fuel taxes have traditionally provided but also to remedy the other shortcomings of fuel taxes: lack of transparency, lack of accountability of road providers to road users and the fact that the fuel tax is a tax rather than a true user fee.

Federal Highway Administration (FHWA) statistics show that vehicle miles traveled in Wisconsin increased from about 59.8 billion miles in 2014 to a peak of 65.7 billion in 2019, an average annual rate of growth of about 2% per year. As noted earlier, the pandemic significantly reduced travel in the state in 2020 and throughout most of the U.S. Full recovery can be expected by 2022 or 2023, with a resumption of growth thereafter.

Fuel consumption in the state increased by about 1% per year through 2019, slightly lower than VMT growth, a difference largely attributable to the ongoing increase in fuel efficiency. In 2020, total fuel sales in the state were down due to travel reductions associated with the pandemic. There was significant recovery in 2021, but total fuel consumption was still slightly less than 2019 levels. Fuel tax revenue in 2021 reached almost $1.09 billion, according to Wisconsin Department of Revenue monthly reports. This included about $807.6 million in gasoline tax revenue and $278.5 million in diesel tax revenue.

Connect 2050 projects population growth of 13.5% between 2010 and 2040, to 6.5 million, and statewide VMT growth from 65.9 billion in 2018 to 82.9 billion in 2050.[24] As with the rest of the nation, despite an increase in population and VMT, the biggest contributing factor in Wisconsin's anticipated decline in fuel tax revenue is likely to be the shift toward EVs or plug-in hybrid vehicles. In 2021, EVs represented only about 0.25% of total light vehicles in the state, slightly less than the national average. But significant increases can be expected in the future.

For purposes of this study, fuel consumption forecasts for the state were developed under three alternative scenarios:

- Assuming fuel efficiency changes comparable to the 2022 EIA reference case forecast.
- Assuming a high level of EV penetration in the light vehicle fleet.

- Assuming a mid-level EV penetration level, essentially halfway between the EIA and high-level scenarios.

Figure 2 depicts the underlying assumed levels of EV penetration through 2050 for each scenario.

- The blue curve shows the EV penetration levels in the EIA reference case.
- The high-level EV estimates — the red curve — were derived from the adapted BNEF global forecast. Recognizing the rural nature of Wisconsin and current EV levels, future Wisconsin high-penetration levels were assumed to be 10% to 15% lower than the national forecast. This assumes EVs eventually will reach around 47% of the light vehicle fleet by 2050.
- The green curve shows the mid-level scenario, which assumes about 28% EVs by 2050.

Figure 2

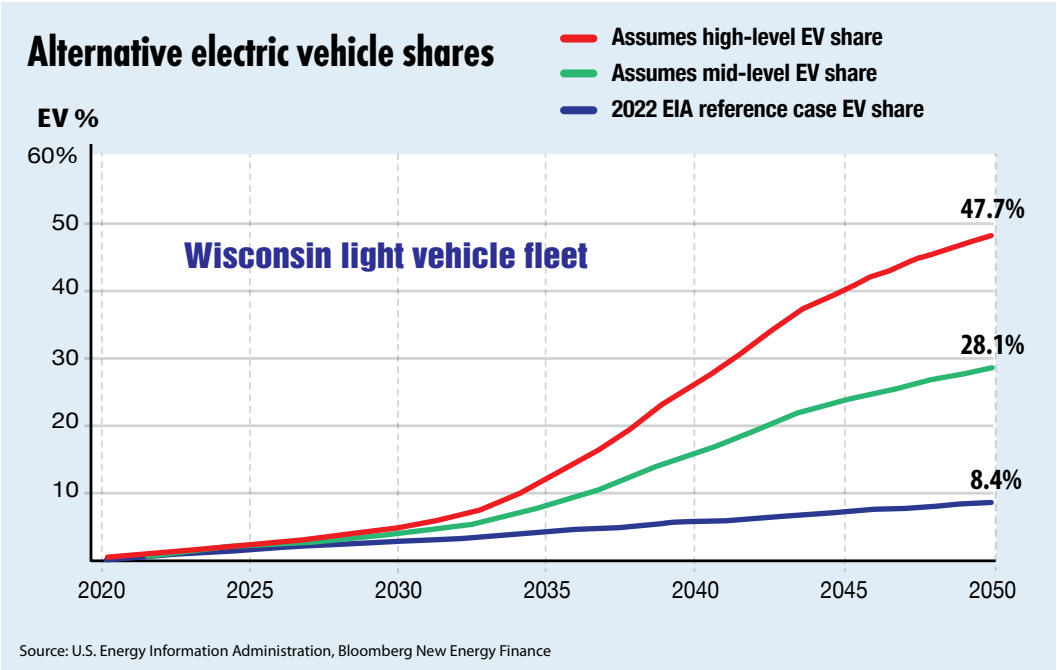
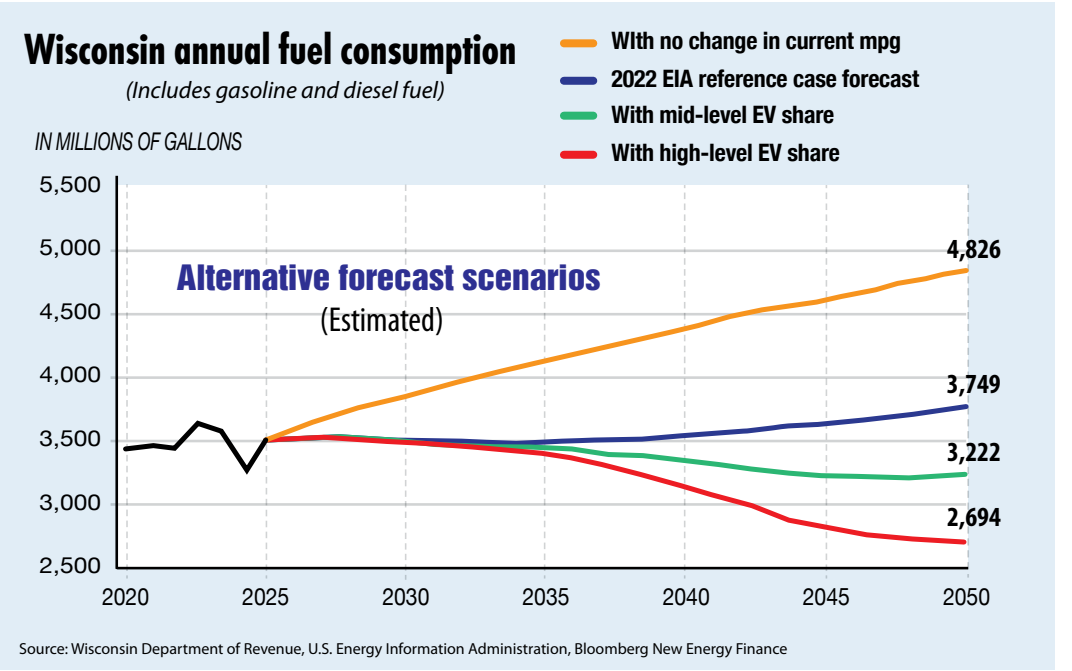


Figure 3 depicts four alternative projections of total fuel consumption in the state through 2050. The black line on the left reflects actual historical consumption levels between 2015 and 2021. The orange line reflects what fuel sales would be with no changes in current fuel efficiency and EV shares. This is purely hypothetical and serves only for comparing estimates under other scenarios.

The analysis assumes travel will grow by an overall average of about 1% per year after 2022 and estimates trucks and other diesel-powered vehicles represent about 10% of VMT.

If there were no changes in fuel efficiency, total fuel sales in the state would increase from about 3.6 billion gallons in 2022 to more than 4.8 billion gallons by 2050 — but since that

Figure 3



will not happen, the orange line is included for reference only.

Using the EIA reference case parameters, shown in blue, future fuel consumption will likely decline slightly over the next decade (after full recovery from the pandemic). In the later years, small increases are projected, but by 2050 fuel consumption still would be 22.3% lower than the hypothetical "no mpg change" scenario. As the share of EVs increases, fuel sales projections decline significantly.

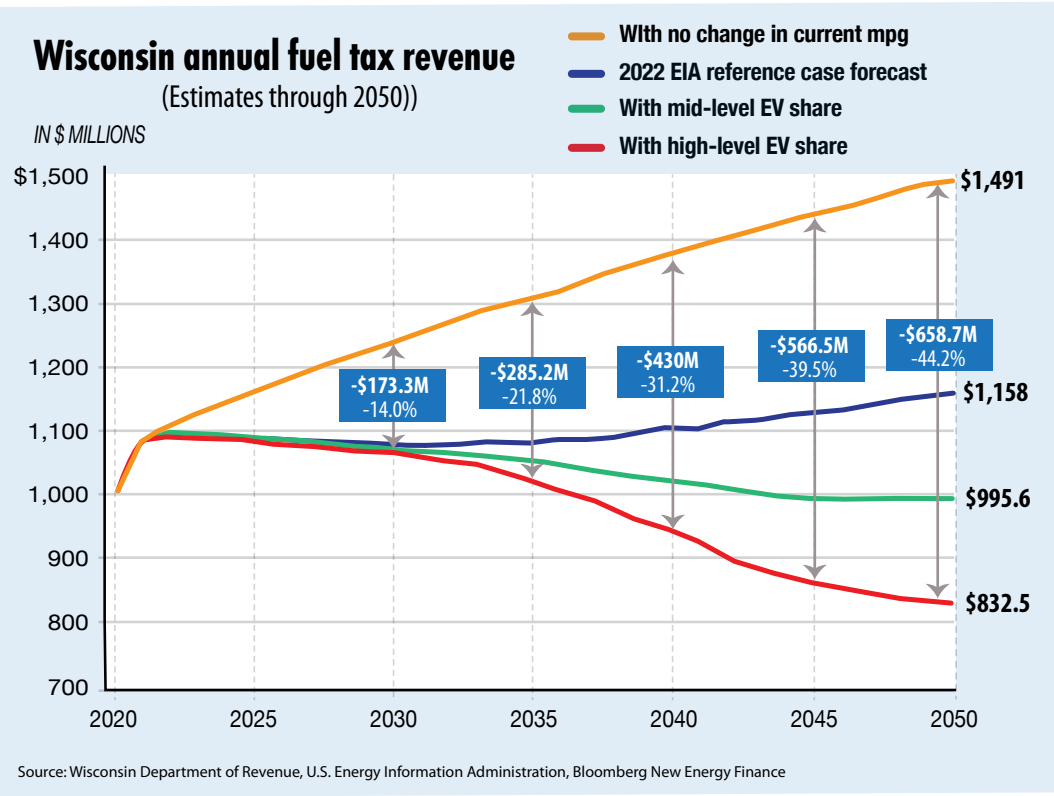
In the mid-level EV scenario — which ultimately may prove to be an underestimate of EV penetration — fuel consumption would decline by more than 33% by 2050. Under the high-level EV scenario, the 2050 decline is estimated at more than 44%.

Figure 4 displays estimated Wisconsin fuel tax revenue through 2050 under the hypothetical "no mpg change" condition and the three alternative scenario forecasts. Even with the optimistic EIA reference case forecast, significant reductions can be expected. Under the worst case — assuming a high level of EVs — fuel tax revenue in Wisconsin would be reduced by more than 31% by 2040 and almost 45% by 2050.

Anticipating a revenue problem because of EVs, Wisconsin implemented an annual surcharge, in addition to annual registration fees, for EVs beginning in 2018 ($100 per year) and for hybrid EVs beginning in 2020 ($75 per year). Assuming a high level of shifts to EVs, the current level of supplemental fees would generate $200 million to $250 million in annual revenue by 2050.

This is well short of compensating for the estimated $659 million reduction in annual fuel

Figure 4



tax revenue that can be expected under the high-level EV scenario and still short of the $496 million reduction that can be expected under the mid-level EV scenario. To make up for the shortfall in fuel tax revenue, legislators might consider increasing the gasoline and diesel tax for those still using conventional vehicles. Regan's calculations show that for the mid-level EV penetration case, the fuel tax rate would have to increase by 50%, to $0.463 per gallon, by 2050. In the high-level EV penetration case, the fuel tax rate increase needed to make up for the revenue shortfall would be 79%, for a rate of $0.553 per gallon by 2050.

By contrast, in the high-level EV case, by 2050 almost half of all light vehicle operators would be paying *no fuel tax at all.* This would be a shift away from the basic users-pay/users-benefit principle inherent in the traditional motor fuel tax: The more miles a vehicle is driven, the more fuel it consumes and the more tax it pays. These projections underscore the case for shifting all vehicles to a sustainable funding source, such as a mileage-based user fee.

What Americans Think About Mileage-Based User Fees

While many transportation policymakers consider a per-mile charge as the best replacement for per-gallon fuel taxes, many Americans have a negative impression of mileage-based user fees (MBUF). In surveys about possible future highway funding sources, only

about one-quarter of the public sees per-mile charges as a good idea. In an online survey for Wisconsin's *Connect 2050* transportation plan, respondents were supportive of a vaguely phrased "sustainable and predictable funding sources for transportation" (2.7 out of 3 rating) and exploring and implementing funding sources "other than the gas tax" where feasible (2.3 out of 3 rating).[25]

But when it came to the specific approach of "Further exploration of a mileage-based user fee (based on actual miles driven)" as a way to contribute to transportation funding in Wisconsin, respondents rated the approach 1.7 out of 3.[26] Tolling as a funding source earned the same rating as an MBUF — even though many Wisconsin drivers are familiar with the no-stopping nature of the Illinois Tollway electronic collection system.

Across the nation, one reason for this resistance to MBUF may be privacy concerns, amid media hype over government tracking: "Big Brother in your car." Few drivers consider how closely they already are tracked by their own vehicle's electronics (including the GPS) as well as their insurance companies, their smartphones, laptops and tablets, and Tile and Apple AirTag trackers stowed in their purses and backpacks.

Suspicious taxpayer groups seem certain that a per-mile charge would become yet another tax on driving instead of replacing the fuel tax. They can hardly be faulted for mistrusting government, given the steady increase in federal fuel taxes through the decades and the diversion of those revenues from roads and bridges.

Auto manufacturers continue to increase their focus on hybrid and all-electric vehicles, which use less or no petroleum. This will further affect the revenues generated by taxing fuel even as vehicle miles traveled continue to increase.

Furthermore, anti-automobile and anti-highway activists, seeking to discourage driving, would like any per-mile charge to include additional taxes on emissions, noise and other impacts of driving, real or imagined. And Americans who appreciate the freedom and flexibility of the automobile and the nation's wide-open spaces are inclined to see the switch to per-mile charges as a threat to their mobility and independence.

At the same time, while Wisconsin's policymakers have investigated the possibility of tolling, there appears to be little movement toward this approach — even though the state is almost surrounded by states that toll. With the state not moving forward on tolling, an approach clearly familiar to its motorists, it's no surprise that there is little interest in the less-familiar MBUF concept, especially when Wisconsin policymakers recommended considering *adding* the fee, rather than considering it to *replace* the fuel tax.

The mileage-based user fee concept is not new, however, and Wisconsin would have the benefit of the experiences of the numerous state pilot projects already completed or under way. These have improved understanding of what an MBUF system would actually look like. Nearly all of the pilot projects:

- Gave participants a choice of several methods to record their miles traveled and

for how those miles would be reported to the government.
- Did not "track" or report the time and place of every trip made.
- Used private, third-party companies to handle the reporting of miles to the government.
- Calculated what participants would have paid and compared that to the state gas tax they had actually paid for the miles driven during the test.
- Made clear that a state MBUF would *replace* the state fuel tax, not be charged in addition to it.
- Made use of stringent privacy protections for the mileage information collected.

Several pilot projects actively recruited public officials to be among the participants,

The impending threat of shrinking gas tax revenue

This report is premised on the predicted long-term decline in revenue from Wisconsin's motor fuels tax. This revenue will decline for reasons laid out at length: ongoing improvement in miles per gallon for gas-powered cars and increasing use of electric vehicles. The only disagreement is in the degree and speed of decline, and perhaps at how theoretically high a gas tax on the dwindling number of fuel customers could go.

It is worth noting that Wisconsin's fuel tax revenue is not declining — yet — but the stagnating numbers demonstrate the imminent threat. Analyst Dale Knapp noted as much in a 2019 paper for the Badger Institute, "Transportation funding dilemma" (https://bit.ly/3AcF9Sr), observing that while gas tax revenue rose at a 3.2% average annual rate in the first seven years of this century, that growth turned into a decline averaging 0.7% annually during the Great Recession and its slow-growth wake. The turning point followed the end, in 2006, of regular inflation-linked increases in the gas tax rate.

From 2013 through 2018, gas tax revenue resumed growth, but slowly — 1.9% a year on average. The last full fiscal year before the COVID-19 pandemic, ending June 30, 2019, was no improvement: The five-year average growth rate in gas tax revenue was 1.3%, according to Wisconsin Department of Revenue data, for the five fiscal years ending in mid-2019. The 10-year average was just under 1%.

Knapp, now with Forward Analytics and for 18 years with the Wisconsin Taxpayers Alliance, pointed out in his 2019 paper that even the slow growth was projected to end soon. "Average fuel efficiency is expected to rise almost 24 percent through (2027), resulting in gas tax collections falling from just over $1 billion to $995 million in 2027," he wrote, quoting Department of Transportation projections. Revenue from fuel taxes and registration fees was expected to rise a total of about 4% over the decade leading to that year.

And that, he wrote on the eve of the pandemic, was vulnerable to a recession: "A deep or protracted downturn could have a devastating impact."

Indeed, for fiscal year 2020, which included the first four months of the pandemic, Department of Revenue figures show fuel tax revenues down 4.1% from the previous year. The strong recovery in fiscal year 2022, which ended June 30, brought total fuel tax revenues back only to 3.9% above the 2019 figure.

which gave those officials firsthand experience in how it worked. In general, most participants in the pilot projects came away with a positive view of the case to switch to per-mile charges.[27]

What is increasingly clear is that a strong, consistent and positive public education component is essential to the success of such a program. It would be unwise for a state DOT to focus single-mindedly on the MBUF as a way to fix a looming revenue shortfall, rather than pointing out the overall benefits of a much-improved highway system. When average people hear that the government needs more revenue, they tend to dig in their heels and tighten the grip on their wallets. While the revenue shortfall is indeed real and worrying, motorists and trucking companies deserve to see a genuine value proposition in making a major switch in highway funding.

In a 2019 Reason Foundation policy paper,[28] the co-author of this study suggested two elements of such a value proposition:

- Fix all of the shortcomings of the 100-year-old fuel taxes, not just its coming revenue shortfall.
- Begin the transition with something that offers large, visible benefits to highway users.

The next two sections expand upon those ideas.

Fixing All of the Fuel Tax's Shortcomings

Most proposals to replace fuel taxes with per-mile charges focus only on the declining revenues. But the fuel tax has four other shortcomings. If Wisconsin and other states replace the fuel tax with a better funding source (a challenging undertaking), a sensible approach would be to consider whether the MBUF can be designed to fix the other shortcomings.

Fuel taxes don't keep pace with roadway needs.
Wisconsin's motor fuel tax has not been adjusted since 2006, when the state eliminated adjustments based on the Consumer Price Index. Between 2010 and 2020, the state added nearly 207,000 people, according to the U.S. census, which put the 2020 population at about 5.9 million. *Connect 2050* projects the population will reach 6.5 million by 2040; statewide vehicle miles traveled (VMT) are forecast to grow from 65.9 billion in 2018 to 82.9 billion in 2050.[29] More of the highway budget will need to be spent on widening existing corridors, rebuilding and enhancing aging ones, and on increased maintenance. Charging all vehicles per mile driven will help highway funding keep pace with the growth in population and roadway travel.

Fuel taxes are not transparent.
For other vital infrastructure (electricity, water, telecommunications, etc.), consumers receive a bill from the provider. The bill reports how much the customer used, the rate per "unit" of use and the total the customer owes. The customer sees what she used and the basis for the charges, and also knows who the provider is. With highways and other roads,

how much the customer paid and the identity of the provider are obscure.

In his book "Rethinking America's Highways," the lead author of this study included a table showing that several years ago the average U.S. household paid just $46 per month in federal plus state gas taxes, far less than for any of the other utilities[30] (e.g., for electricity, the national average was $107 per month). Further, Americans have no idea who provides which roadways and, therefore, whom to hold accountable for problems. Many people even believe the federal government owns the Interstate highways, when in fact the states own and operate them.

Fuel taxes are a one-size-fits-all method of charging.
In Wisconsin, drivers pay an average of 1.3 cents per mile driven.[31] That is the same whether someone drives solely on local streets and roads or mostly on freeways and other major highways. The cost of building and maintaining freeways is several times as much as for local streets, but 1.3 cents per mile is *far more* than is needed for local streets and two-lane rural roads. With this way of paying for roads, the people who use rural and local roads pay more than those roads cost, while those who use freeways pay less than they cost. That is not equitable.

Instead, imagine starting with a clean sheet of paper to design a per-mile charge system that addresses all of the above shortcomings, making it more like paying a utility bill than the current tax. It would have the following attributes:

- A true user fee, paid only by those who use roadways and spent only on roadways.
- Equitable to all users, with different rates for major highways (Interstates and freeways) compared with other roadways.
- Transparent, making it clear which provider is responsible for which roadways.
- Subject to periodic increases, when justified by increased operating and capital costs, via a public process similar to rate-setting for utilities.

Starting the Transition via Major Highway Improvements

WisDOT's two recent long-term transportation plans and the transportation funding study ordered by legislators highlight understandable concern about the decline in fuel tax revenues. But policymakers should steer clear of making revenue shortfalls the primary rationale for a transition from shrinking per-gallon taxes to more equitable per-mile charges. The focus should be the need for *major investment in the state's aging and heavily used highway system*, which must be prepared for projected population growth over the next three decades.

The core of Wisconsin's highway system is the limited-access highways: long-distance Interstates and the urban freeway system. The Interstate system was authorized in 1956, and most of its corridors were built in the 1960s and early 1970s. That makes most of the system 50 years old or older, well beyond its original design life. Wisconsin has widened portions of its Interstate system and continues to develop plans for reconstruction and widening.

In the 2015 Fixing America's Surface Transportation (FAST) Act, Congress asked the Transportation Research Board (TRB) to convene an expert committee to study the future of the nation's Interstate system. The committee's 596-page report was released in December 2018.[32] Among its main findings:

- Much of the Interstate pavement is wearing out and needs to be replaced.
- The system has numerous bottleneck interchanges that are obsolete and should be replaced.
- There are not enough lanes in many corridors for projected growth in motorist and truck travel in coming decades.
- The system could benefit from dedicated truck lanes in some key freight corridors, but there are none. The only U.S. truck-only lanes planned, on I-75 in Georgia between Macon and McDonough, are expected to begin construction in 2030.

In its major report to Congress, the TRB committee suggested a repeat of the original 90% federally funded Interstate highway program, which it estimated would require raising and spending an average of $57 billion per year for the next 20 years (totaling about $1.1 trillion). Doing so would necessitate a massive increase in federal gasoline and diesel taxes, which is highly unlikely. The committee's report also discussed the possibility of financing this huge set of projects based on projected toll revenues, which would require amending the 1956 federal law to permit the use of tolls on the 90% of the Interstate system where tolling is not allowed.

In the worst case, by 2050, almost half of all light vehicle operators would be paying no fuel tax at all. This would be a shift away from the basic users-pay/ users-benefit principle.

A 2019 Reason Foundation policy study responded to the TRB committee's report, recommending the toll-financed approach to rebuilding and selective widening.[33] It also proposed expanding an existing three-state pilot program to allow any state that decided to take this approach to use it to begin the transition from per-gallon taxes to per-mile charges.

In Wisconsin, this could be done along the following lines. WisDOT would develop a 20- to 30-year plan to reconstruct and modernize all its limited-access highways — the Interstate highways and urban freeways without Interstate numbers. It would decide on the order in which each corridor would be modernized and would explain that the modernization of each would be financed by the future revenues from newly instituted mileage-based user fees for the relevant corridor, with fuel tax rebates for miles driven on the corridors converted from fuel taxes to MBUF.[34]

As each corridor was finished and reopened to traffic, motorists and truckers would pay new per-mile fees *instead of* state gasoline and diesel taxes. An operating system — perhaps the same as the Illinois tolling system, given that nearly a million Wisconsin vehicles have I-PASS transponders already — would calculate the amount of fuel each customer used driving the rebuilt corridor (based on the vehicle make and model plus its EPA highway fuel economy rating), and software would calculate rebates of the state fuel taxes

still in place for all other roads. This would demonstrate to people that the new per-mile charge serves as a *replacement* for the fuel tax.

Via this process, over several decades, almost 30% of all Wisconsin vehicle miles of travel would be converted from being paid for by per-gallon taxes to per-mile charges, *with no users paying both fuel taxes and per-mile charges for the same roadway.*

Starting with limited-access highways (where there are only a few places to get on and off) means that the transition to per-mile charging can begin by making use of technology already in use around the country and widely accepted. Using the popular Illinois Tollway I-PASS (or something similar), consisting of windshield-mounted transponders supplemented by license-plate imaging, avoids the need for near-term decisions about any new technology required in cars and trucks to enable per-mile charging for open-access roadways and numerous state-numbered highways as well as local streets. Equipping all of those other roadways for charging via the I-PASS (or another) transponder would require many thousands of gantries to record vehicles' passage, which would be far too costly (and unsightly).

Under the worst case — assuming a high level of electric vehicles — fuel tax revenue in Wisconsin would be reduced by more than 31% by 2040 and almost 45% by 2050.

The initial program outlined here — for limited-access highways only — would serve as a guarantee to drivers that per-mile charges would indeed *replace* per-gallon taxes, as each corridor was modernized and opened with the new charges *and* rebates of the fuel tax paid for driving those miles. Highway user tax rebates like this are already being provided to trucking companies that use the Massachusetts Turnpike and the New York Thruway, both of which are tolled Interstates. The rebate process has been automated by trucking service provider Bestpass, which offers trucking companies a 48-state universal toll transponder and consolidated billing service.[35] Highway user-tax rebates are not simply a theory; they are in actual practice in two states.

How to Transition All Other Roadways to Per-Mile Charges

Ultimately, as fuel tax revenue declines, Wisconsin and other states should expect to phase out this tax altogether and plan for replacing it with per-mile charges statewide. Converting limited-access highways first will provide breathing room, because as each segment of an Interstate or other limited-access highway is converted to per-mile charges, that portion of the state's overall highway system will become self-supporting and will no longer consume a portion of the declining revenue from fuel taxes. Fuel tax revenues will no longer have to cover the ongoing maintenance of those corridors and, more importantly, will not have to be used to rebuild and widen those corridors that have been converted.

As noted previously, the I-PASS-type transponder system would not work for the open-access state highways (which include critically important urban arterials). Nor would it work for local streets and roads. But if limited-access highways are converted first, Wiscon-

sin will have many years to learn from other states' pilot projects and to experiment with customer-friendly ways for roadway users to record and report their other miles of travel.

While Wisconsin has not considered a pilot project to test various features of a state mileage-based user fee, the state should plan to do so in the near future. In designing such a project, the state can take advantage of what has been learned by states that already have implemented one or more MBUF pilot projects. Role models may be on the way: In January 2022, the U.S. Government Accountability Office recommended the Federal Highway Administration "develop and apply criteria to assess the scalability" of the MBUF pilot projects implemented since 2016 by 13 states, including two multistate coalitions.[36]

Here is a brief summary of key features that have been well-received by participants in MBUF pilot projects elsewhere:[37]

- Keep it simple and understandable: a user fee to pay for roads.
- Replace the state gas tax, rather than adding the fee on top of that tax.
- Make it fair to both rural and urban users, including lower per-mile charges for rural roads and local streets.
- Make it transparent and self-explanatory, as with utility bills.
- Use private firms, selected competitively, to handle collecting, processing and protecting miles-traveled data.
- Legislate strict privacy protections for miles-traveled data.

Among the options for recording miles of travel that have been offered to participants in state pilot projects are the following:

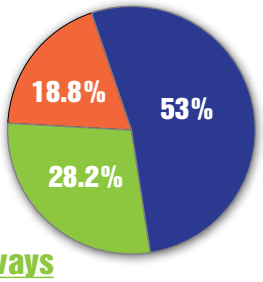
- Annual odometer readings at the time of vehicle registration renewal.
- An all-you-can-drive option under which the annual charge would be the equivalent of what the vehicle would owe for driving twice the average number of miles driven per vehicle in that state.
- An onboard unit that plugs into the OBD-II port beneath a vehicle's dashboard and records miles driven, and if certain location information is needed (e.g., if some miles are driven across a state or county border), those miles are identified using cell-tower data.
- An onboard unit that uses GPS to provide more precise location data than is available by using cell-tower data.

It is important to remember that the GPS system of satellites does not "track" anyone. GPS signals permit the vehicle's computer or its operator to know where the vehicle is at any given time. That information can be stored on the vehicle, but it would only be uploaded, along with the total miles driven, if that is what the customer signed up for. It would operate much like the GPS receiver in a smartphone, which lets the phone's owner know his or her device location at any time but does not transmit that information to anyone else without the owner's permission, per the phone's terms of service. Regardless of which method of reporting miles is used, stringent privacy protection for that data must be ensured by statute.

Table 2

Wisconsin vehicle miles of travel (VMT)
By type of roadway (2020)

IN MILLIONS OF MILES



Local roadways

Minor collectors, rural	2,012
Local roads, rural	3,846
Major collector, urban	2,492
Local roads, urban	2,437
Subtotal: 10,787	

Limited-access highways

Interstates, rural	5,210
Interstates, urban	7,045
Other freeways and expressways, urban	2,939
Other freeways and expressways, rural	1,066
Subtotal: 16,260	

State highways and arterials

Minor arterials, rural	4,231
Minor arterials, urban	5,215
Major collectors, rural	7,199
Other principal arterials, rural	5,689
Other principal arterials, urban	8,219
Subtotal: 30,553	

Total Wisconsin VMT: **57,600**

Source: FHWA Highway Statistics, Table VM-2

Assuming Wisconsin begins the transition to per-mile charging using the I-PASS system with which the state's drivers are familiar (or something similar) on all the limited-access highways, that system will handle the revenue collection for all of *those* miles of travel. That would be nearly one-third — 28.2% — of all the VMT in the state, as shown in Table 2.

The next challenge is how to charge for the remaining VMT, driven on two different categories of roadway: those with state and U.S. highway numbers that are owned by WisDOT and maintained under contract by counties and cities, and the remaining local roads and streets that are the responsibility of counties, cities and villages, and towns.

Ideally, fees would differ according to the type of road a motorist drives on, with higher charges for costly limited-access highways and lower charges for two-lane highways or for local roads that cost less to build and maintain. But a system like this would require very precise data, such as that provided by GPS. A second-best option could involve calculating the funding needed for roads of each type — either according to Wisconsin's current systems for funding the trunk highway system and for county and local road aid, or by a new state/local split — and dividing that by the projected miles driven on them in a year to arrive at an average per-mile fee that is then assessed via an odometer reading or another method.

The aim is to provide a transparent system under which roadway customers know who provides which set of roads they use, what they charge per mile traveled and, therefore, what they must pay, like the utility bills everyone is familiar with. Figure 5 provides a hypothetical roadway user fee statement. This concept assumes an annual statement comparable to property tax bills, but it would also be possible for people to pay their highway bills in quarterly or monthly installments.

Conclusion and Recommendations

For more than a decade, Wisconsin's transportation policy has failed to address the impending decline in revenue from per-gallon gasoline and diesel taxes. It was not until 2018 and 2019 that the state began to hold electric vehicles and hybrid vehicles somewhat accountable, imposing flat annual surcharges on both. Wisconsin has not directly participated in any of the pilot projects created by Congress to allow states to experiment with mileage-based user fees. Other states that have developed MBUF pilot projects have learned a great deal about how such a program might work. A first step for Wisconsin should be to gain approval from the Federal Highway Administration for a Wisconsin MBUF pilot project.

Figure 5

SAMPLE ROADWAY USER FEE BILL

2035 WISCONSIN ROADWAY UTILITY STATEMENT

ACCOUNT INFORMATION

Account Number
Name
Address

ROADWAY USE AND CHARGES

Providers	Per-mile Rate	Miles Driven	Amount
County Agency	2.0 cents/mile	3,122	$62.44
Wisconsin DOT	2.5 cents/mile	6,048	$151.20
(Limited-Access Providers*)	5.5 cents/mile average	4,830	$265.65*
Total		14,000	$479.29
Amount Due			**$213.64**

*billed separately

ROADWAY USAGE

AMOUNT DUE: $213.634

In recommending that Wisconsin plan to shift from per-gallon taxes to per-mile charges for roadway funding, this study also has recommended that the objective should be not merely to replace the revenue that fuel taxes have traditionally provided but also to remedy the other shortcomings of fuel taxes. These include lack of transparency, lack of accountability of road providers to road users and the fact that the fuel tax is a tax rather than a true user fee like a utility bill.

Any switchover from fuel taxes to mileage-based user fees will necessarily be gradual. This study recommends beginning the transition with limited-access highways. The charging method is an electronic transponder, with which many Wisconsin motorists are already familiar, thanks to the I-PASS system in Illinois. The charges to use the limited-access system would be stated on a per-mile basis. Customers who pay these new electronic per-mile charges would be given rebates for the amount of state fuel taxes incurred for their miles driven on the per-mile-charged limited-access system. When this step is completed, about 28% of Wisconsin's vehicle miles of travel will have been transitioned from paying per-gallon to paying per-mile. Customers will receive regular statements documenting the miles driven and amounts charged via mileage-based user fees.

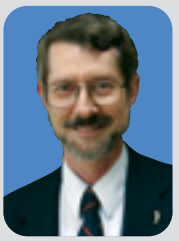
Once success has been sufficiently demonstrated in the transition of limited-access highways, Wisconsin should move to the next step: planning the transition of state and local roadways to a per-mile charging system. As success is shown in other states — including Oregon, Utah and Virginia — Wisconsin can learn and benefit from their experiences. By the time serious implementation planning is under way for state and local roadways, many of the kinks will be worked out elsewhere.

The U.S. Department of Transportation has agreed with the Government Accountability Office's recommendation that the Federal Highway Administration establish criteria to assess the scalability of MBUF pilot projects in the states. Road-user charging technology will have advanced, and a number of states that have participated in MBUF pilot projects can be expected to be paving the way with statewide systems in the early stages of implementation.

In the near term, besides embarking on its own MBUF pilot project, state transportation policymakers should prioritize two further next steps. Wisconsin already has drawn on the findings of the Transportation Research Board's landmark study on the future of the nation's Interstates and is among the states that have investigated the need to modernize the limited-access system (including reconstruction, replacement of bottleneck interchanges and widening where needed). This corridor-by-corridor scrutiny has produced cost estimates and timeframes for various projects, including the feasibility of financing these projects based on bonding the revenue streams. It is time to lay out a master plan for renewal of the state's entire limited-access highway system of Interstates and freeways.

In addition, should any measure be introduced in Congress that would reduce or eliminate the 1956 ban on using tolls on the 90% of the Interstate system that is non-tolled, Wisconsin policymakers should strongly support such a measure. The MBUF to be implemented on Wisconsin Interstate corridors could be interpreted as per-mile tolls, unless federal law is changed to permit such a change.

About the Authors



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His 1988 policy paper proposing supplemental privately financed toll lanes as congestion relievers directly inspired California's landmark private tollway law (AB 680), which authorized four pilot projects including the highly successful 91 Express Lanes in Orange County. Over two dozen states have enacted similar public-private partnership legislation. In 1993, Poole oversaw a study that introduced the term HOT (high-occupancy/toll) Lane, a concept that has become widely accepted since then.

Poole has advised the Federal Highway Administration, the Federal Transit Administration, the White House Office of Policy Development and National Economic Council, the Government

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A journalism graduate of Rhodes University in Grahamstown, South Africa, Cotton-Orr immigrated to the United States in 1986.

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