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LOW TECH MILEAGE-BASED USER FEES OPTIONS

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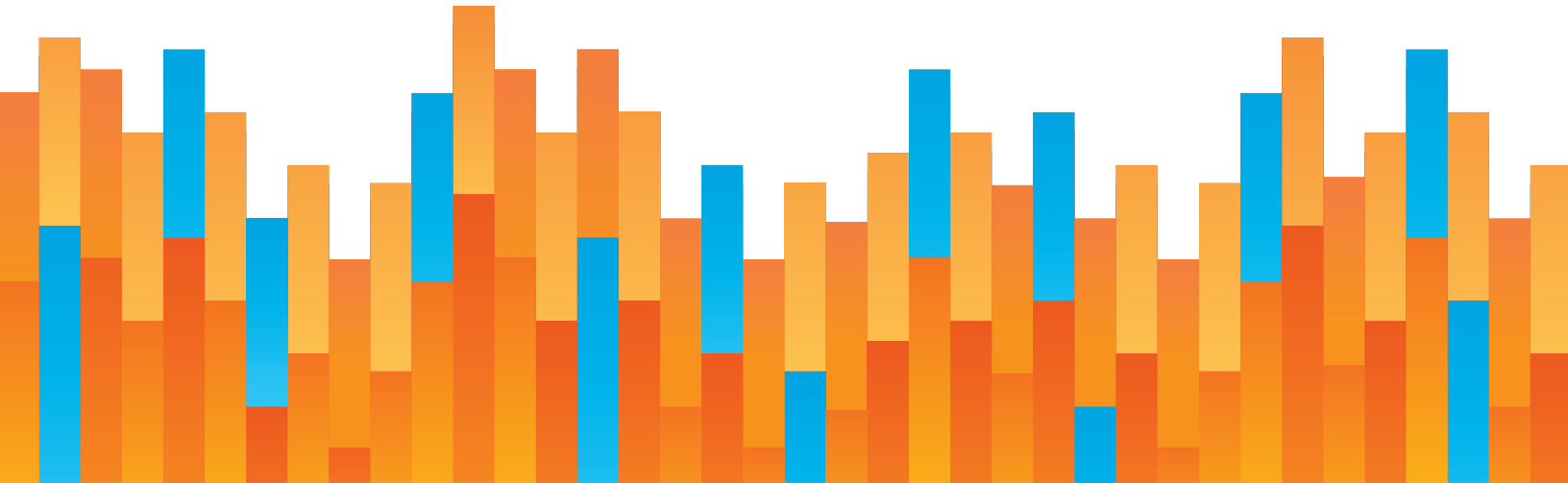
June 2025



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PART 1

OVERVIEW OF MBUFS

For the past 100 years, most arterial highways throughout the U.S. (including the Interstate Highway System and most state highways) have been funded by the motor fuel tax. Unfortunately, over the last 20 years due to the combination of a growing number of electric vehicles, a growing number of hybrid vehicles, and the greater fuel efficiency of vehicles powered by internal combustion engines, fuel tax revenue has declined significantly. Given these trends, the motor fuel tax will not be a sustainable revenue source over the next 100 years.

The motor fuel tax can be compared to a rockstar on his farewell tour. It is still producing revenue, but it is not as effective a mechanism as when it was at its peak. Further, most transportation analysts know that it is time for something more sustainable.

Over the past 20 years, researchers have examined a number of different alternative transportation funding sources such as a freight charge per ton, tire fees, registration fees, and sales taxes. About 10 years ago officials with the American Association of State Highway and Transportation Officials (AASHTO) created a comprehensive funding matrix.[1] The impetus for the chart was the decline in revenue from the motor fuel tax. AASHTO was examining how fuel tax revenue could be replaced. The organization looked at more than 35 funding sources based on the users-pay/users-benefit principle (in which people who

[1] "Matrix of Illustrative Surface Transportation Revenue Options," aashto.org, American Association of State Highway and Transportation Officials, Cite AASHTO Guide, 2015. https://downloads.transportation.org/transporevenuematrix2014.pdf (10 Oct 2023).

use roadways more pay more, those who use roadways less pay less, and those who do not use them pay nothing at all) and using general funds, the most significant of which are detailed below in Table 1.

TABLE 1: TRADITIONAL AND ALTERNATIVE TRANSPORTATION REVENUE SOURCES

Source	6-Year Revenue*	Source	6-Year Revenue*
Motor Fuel Tax Diesel	$41.79	Motor Fuel Tax Index to Inflation, CAFE Standards (Additional Revenue)	$10.87
Motor Fuel Tax Gasoline	$78.12	Oil, Gas, and Minerals Receipts	$14.25
Heavy Vehicle Use Tax	$3.42	Registration Fee Electric LDVs	$0.06
Sales Tax Trucks and Trailers	$2.19	Registration Fee Hybrid LDVs	$1.12
Tire Tax Trucks	$0.23	Registration Fee Light Duty Vehicles	$23.11
Container Tax	$4.26	Registration Fee Trucks	$10.54
Customers Revenues	$11.66	Registration Fee All Vehicles	$32.21
Drivers' License Surcharge	$6.98	Sales Tax Auto Related Parts	$15.04
Freight Bill Truck Only	$19.90	Sales Tax Bicycles	$0.38
Freight Bill All Modes	$24.60	Sales Tax Diesel	$62.50
Freight Charge Ton (Truck Only)	$7.54	Sales Tax Gasoline	$155.66
Freight Charge Ton (All Modes)	$9.29	Sales Tax New Light Duty Vehicles	$15.61
Freight Charge Ton-Mile (Truck Only)	$9.15	Sales Tax New and Used Light Duty Vehicles	$22.40
Freight Charge Ton-Mile (All Modes)	$22.52	Tire Tax Bicycles	$0.53
Harbor Maintenance Tax	$2.79	Tire Tax Light Duty Vehicles	$2.12
Imported Oil Tax	$37.28	Transit Passenger-Miles Traveled Fee	$5.45
Income Tax Business	$18.06	MBUF Light Duty Vehicles	$175.58
Income Tax Personal	$43.36	MBUF Trucks	$70.73
Motor Fuel Tax Index to Inflation Diesel	$5.22	MBUF All Vehicles	$246.31

***Revenue is from 2014, the original creation of this chart**

Source: Matrix of Illustrative Surface Transportation Revenue Options, American Association of State Highway and Transportation Officials, https://downloads.transportation.org/transporevenuematrix2014.pdf

After looking at all of the options, researchers determined that the MBUF (otherwise known as a road usage charge, road charge, or vehicle-miles traveled fee) was the most promising of all of the revenue sources that they studied.[2] A mileage-based user fee (MBUF) charges drivers based on the number of miles driven, compared with the fuel tax that charges drivers based on the number of gallons of fuel consumed, or a sales tax that charges consumers based on the value of goods purchased. The fee ranked extremely high in economic efficiency and equity, and medium-high in implementation and administrative efficiency.

[2] "Matrix of Illustrative Surface Transportation Revenue Options," aashto.org.

From a fiscal perspective, MBUFs would generate $246 billion over an estimated six-year period, dwarfing every other revenue source including a 10% increase in the motor fuel tax rate ($120 billion) and implementation of a gasoline sales tax ($156 billion).[3] Further, MBUFs were the only option that could generate enough revenue to replace the motor fuel tax (more than $200 billion for automobiles and trucks combined), more than any other option in the AASHTO matrix.

MBUFs also more closely adhere to the users-pay/users-benefit principle. In addition to being an economic advantage, it is also a political one. Transportation must compete with other policy priorities such as health care, education, and defense. And transportation usually loses out to those other priorities in a fight for general revenue sources such as sales taxes and income taxes. Therefore, any revenue sources that do not rely on the users-pay principle are unlikely to lead to sustainable transportation revenue.

> *… any revenue sources that do not rely on the users-pay principle are unlikely to lead to sustainable transportation revenue.*

Even though MBUFs scored well in implementation and administrative efficiency, there is room for improvement. Parts 3 and 4 of this policy brief examine some of these challenges and how they can be addressed.

Equity implications are mentioned multiple times in both the 2015 and 2019 versions.[4] Specifically, the report examined geographic equity and equity among drivers of different propulsion methods. While many drivers would assume that rural residents would pay more, rural drivers actually pay less in MBUFs than they would in fuel taxes because they tend to drive older, less-fuel-efficient vehicles. With fuel taxes, drivers pay varying amounts depending on their vehicle's powertrain, despite the fact that all light-duty vehicles wear out pavement at about the same rate. Drivers of electric vehicles pay no fuel tax at all, while drivers of hybrid vehicles pay approximately half of what drivers of conventional fuel

[3] Ibid.

[4] "Matrix of Illustrative Surface Transportation Revenue Options," transportation.org, AASHTO, Jan 2019. https://transportation.org/funding-finance/wp-content/uploads/sites/42/2023/01/Matrix_of_Funding_Options.pdf (5 June 2025).

vehicles pay. With MBUFs, all light-duty vehicles that travel the same distance pay the same amount, regardless of powertrain.

> *Drivers of electric vehicles pay no fuel tax at all, while drivers of hybrid vehicles pay approximately half of what drivers of conventional fuel vehicles pay. With MBUFs, all light-duty vehicles that travel the same distance pay the same amount, regardless of powertrain.*

The AASHTO matrix did not seek to explain MBUFs, but in some ways they are most similar to what Reason Foundation calls 21st century per-mile tolling. Both MBUFs and tolling charge drivers a per-mile rate. The biggest difference is in the geography. Tolls are charged for a specific stretch of highway while MBUFs are charged for the entire system. For this reason, both are better user fees than the fuel tax, which charges drivers a per-gallon rate regardless of where they drive.

However, both MBUFs and 21st century tolling would be different from today's toll roads, which often employ double taxation. Currently, motorists on most toll roads pay both a fuel tax and a toll, with only two states offering a rebate on fuel taxes. Motorists may also pay a variable toll on express toll lanes, although that toll is designed to manage congestion, not to raise revenue. In MBUF pilot and permanent programs where money is exchanged, drivers receive a rebate for any fuel tax that they pay. It is crucial that any potential MBUF pilot refunds fuel taxes and tolls to prevent any double taxation.

Regarding implementation, because they charge for the exact amount of roadway that a vehicle uses and can be varied based on the type of highway, many transportation researchers consider GPS-enabled and location-based MBUFs to be the ideal solution.[5] Currently, pilot and permanent MBUF systems are divided into high-tech and low-tech MBUFs. The following section provides a brief overview of how a high-tech MBUF functions.

[5] David C. Coyle et. al, "From Fuel Taxes to Mileage Based User Fees: Rationale, Technology, and Transitional Issues," https://cts-d8resmod-prd.oit.umn.edu, ITS Institute, August 2011. https://cts-d8resmod-prd.oit.umn.edu/pdf/cts-11-16.pdf 22 Feb 2024.

PART 2

HIGH-TECH MBUF OPTIONS

High-tech MBUFs are the gold standard for implementing this technology. Most high-tech options use a GPS-enabled mileage-recording device that plugs into a vehicle's OBD-II diagnostic port. Because it can monitor where and when a vehicle uses a highway, it allows transportation agencies to charge differing prices at different times of day and on different types of roads. The ability is important because variable time of day pricing can manage congestion and because higher-order highways (Interstates and arterials) cost more to build and maintain than lower-order roadways (local streets). Therefore, vehicles should be charged more to use these types of roadways. Some heavy-duty trucks, with a higher weight per axle, wear out highways much faster than light-duty vehicles, so they should be charged more. In this system heavy-duty trucks would pay more than automobiles.[6]

Several permanent programs and many of the state pilot projects have offered some type of high-tech option. For example, in Oregon the State Department of Transportation launched OReGO in July 2015.[7] Program participants enroll with private contractors (now Emovis, NextMove by Cintra, or GeoToll). Drivers use a GPS device that plugs into their automobile's

6 Alan C. O'Connor et. al. "Economic Benefits of the Global Positioning System," National Institutes of Standards and Technology, nist.gov, June 2019. https://www.nist.gov/system/files/documents/2020/02/06/gps_finalreport618.pdf (1 July 2023).

7 "Road User Task Fee Force," Oregon Department of Transportation, Oregon.gov, 2024. https://www.oregon.gov/odot/programs/pages/road-user-fee-task-force.aspx#:~:text=Oregon%20launches%20the%20nation%27s%20first,they%20paid%20at%20the%20pump. (22 Feb. 2024).

OBD-II port to record their mileage. Drivers pay two cents for every mile driven.[8] They are credited for out-of-state miles and receive value added services (such as the diagnosing of potential mechanical problems). Currently, all MBUF programs are voluntary. Motorists have the option of continuing to pay the fuel tax instead.

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While the GPS-based option is considered by transportation analysts as the best option, there are several reasons why it might take 10 or more years for it to become universal. Simply because a GPS-based system is the best alternative from a technical perspective doesn't mean that it will be widely accepted by motorists. Drivers have legitimate concerns related to privacy, security, and the costs of collection. While each of these can be mitigated, the solutions can be challenging, and widespread public consensus will not occur overnight. Most importantly, many drivers have strong opposition to invasion of privacy, security threats, or the higher collection costs inherent in current small-scale MBUF programs.

8 "How Does Orego Work," Oregon Department of Transportation, https://www.myorego.org, 2024. https://www.myorego.org/how-it-works/#faq (22 Feb. 2024).

PART 3

COMMON MBUF CONCERNS

The four biggest MBUF concerns that transportation agencies and political researchers have encountered are privacy, security, costs of collection, and speed of implementation. The following sections detail each and provide some potential solutions.

3.1 PRIVACY

Privacy is the most common concern. Some drivers have strong, negative, visceral opposition to any type of vehicle monitoring. This opposition occurs despite the fact that almost all of these drivers have a GPS-enabled smartphone, which means that their location and travel information is accessible to their cellular carrier, and that all new vehicles have black box recorders that collect data on their driving behavior and location.[9]

Further, some legislators have seized on the privacy fears of a new technology and introduced bills to or expressed a desire to limit MBUFs. In Arizona, State Senator Jake Hoffman introduced SB 1312 that was passed by the State Senate to ban pilot and permanent MBUF projects, because he was worried that MBUF charges could be set at

[9] "Does My Car Have a Black Box," rislone.com, Rislone, 2024. https://rislone.com/blog/general/does-my-car-have-a-black-box/ (18 Mar. 2024).

prices designed to reduce vehicle-miles traveled. (The House failed to pass the bill.)[10] In Tennessee, at a mileage-based user fee hearing, former State Senator Frank Nicely described GPS monitoring as the "United States Under Surveillance."[11]

These concerns do not reflect how MBUFs actually operate. High-tech MBUF systems use a GPS system that safeguards privacy. With GPS, satellites broadcast radio signals that transmit their locations and the time from onboard atomic clocks.[12] A GPS receiver detects these signals and uses the time of arrival to calculate its distance from a GPS satellite. Using the distance calculations from at least four GPS satellites, a receiver can determine its position and time. Because GPS signals are sent one-way from the satellites and location is calculated by the GPS receiver using multiple satellites, GPS by itself cannot track the location of a GPS receiver.

Privacy concerns only arise when a GPS receiver is paired with a secondary wired or wireless communications system that can transmit location and time information computed and stored locally on the GPS receiver.[13] Privacy and data security concerns should be focused on secondary communications systems. The best approach is to pass legislation with data retention and access mitigation. Oregon provides the best example.

Oregon requires that raw mileage and location data be deleted within 30 days after the completion of payment processing, billing disputes, or audits.[14] The state only has access to processed data, not the raw granular location data. Oregon uses private account managers;

10 Senator Jake Hoffman, "SB 1312", Fifty-sixth Legislature First Regular Season 2023, 2023. https://www.azleg.gov/legtext/56leg/1R/bills/SB1312P.htm, 8 Feb. 2024.

11 "Presentation to the Senate Transportation Committee, Questions on Presentation of Tennessee Overview of Mileage Based User Fees," Tennessee Senate Transportation Committee, 1 Feb. 2023.

12 Marc Scribner, "Protecting Customer Privacy in Mileage-Based User Fee Collection," https://reason.org/backgrounder/protecting-customer-privacy-in-mileage-based-user-fee-collection/

13 Ibid.

14 "Oregon's Consumer Privacy Act: The A to Z of the OCPA," https://www.osano.com, Osano, 17 Oct 2023. https://www.osano.com/articles/oregon-consumer-privacy-act-ocpa?utm_term=oregon%20consumer%20(23 May 2025).

the state doesn't collect data. Law enforcement can only access the data with a court order. Data encryption is used. Finally, motorists can choose a simpler MBUF system. States that are serious about enacting privacy restrictions would be wise to follow Oregon's lead.

3.2 SECURITY

Another common concern is hacking. Hacking is different from privacy, in that it remains a problem after motorists participate in an MBUF pilot. But lax security can lead to privacy violations, which is the main concern of end users. In a post-pilot survey that The Eastern Transportation Coalition (TET Coalition) conducted, respondents were still somewhat concerned (3.17 on a score of 1-5 where 1 is not concerned and is 5 very concerned) about program security.[15] These concerns were most pronounced for GPS-based systems. At the same time, members were very pleased with the way the pilot administrators handled their personal data, (4.56 on a scale of 1 very unsatisfied to 5 very satisfied).

> *"In previous studies respondents were concerned that governments would use the systems for non-transportation purposes, and insurance companies would gain access to the system to set vehicle insurance rates."*

While a 3.17 might seem like an acceptable score, there is reason for concern. These pilot participants were early adopters of technology. Motorists as a whole are likely to be even more concerned about potential hacking. In previous studies respondents were concerned that governments would use the systems for non-transportation purposes, and insurance companies would gain access to the system to set vehicle insurance rates.[16] Some systems have minor security flaws, and some states are loathe to release data on their system's vulnerabilities. Few DOTs are willing to provide details on the tools and methods that they

15 "Privacy Considerations in a Mileage Based User Fee System," tetcoalitionmbuf.org, I-95 Corridor Coalition, March 2019. https://tetcoalitionmbuf.org/wp-content/uploads/2020/07/Coalition-MBUF-Privacy-Tech-Memo_2019.pdf (1 July 2023).

16 "Mileage-Based User Fee Public Opinion Study," Minnesota Department of Transportation, dot.state.mn.us, August 2007. https://www.dot.state.mn.us/funding/mileage-based-user-fee/opinionstudyreport.pdf (23 Feb. 2024).

are using to protect data. This lack of transparency will not assuage public concerns about security.

3.3 COSTS OF COLLECTION

One of the challenges of any new transportation technology is collection costs. One big advantage of the fuel tax is it is relatively cheap to collect. However, its collection costs are actually much higher than 1%, which is the figure most widely reported. Reasons for the higher costs include tax evasion, exemption of fuel taxes for fuel used in agriculture, and programmatic inefficiencies. One peer-reviewed study pegged the actual cost at 5%.[17] The cost to collect mileage-based user fees at scale is estimated at between 5% and 13% of revenues.[18] However, current collection costs for GPS-based systems in pilot projects average 10%-40%.[19]

One of the challenges of any new transportation technology is collection costs. One big advantage of the fuel tax is it is relatively cheap to collect.

While costs of collection are sure to fall with technological improvements and much greater economies of scale, simple methods are still the most cost-effective. Over the near term, collection costs are likely to remain well over 5%. States developing pilots with high-tech MBUFs are urged to find ways to reduce collection costs by contracting with multiple private account managers. States can reduce costs in other ways by offshoring back-office and call-center functions. These functions are three times more expensive to do in the U.S. than in other countries. Finally, current programs do not serve the unbanked, which may

17 Daryl S Fleming, "Dispelling the Myths: Toll and Fuel Tax Collection Costs in the 21st Century, November 2012. https://reason.org/wp-content/uploads/2012/11/dispelling_toll_and_gas_tax_collection_myths.pdf (1 July 2023).

18 Robert Kirk, "Tolling U.S. Highways and Bridges," Congressional Research Service, crs.gov, 4 Aug. 2017. https://crsreports.congress.gov/product/pdf/R/R44910/5 (1 July 2023).

19 "Collection and Administration Costs," https://dbf.dot.state.mn.us/, University of Minnesota, 2025. https://dbf.dot.state.mn.us/media/utthc2o2/6_admincosts.pdf (22 May 2025),
"Exploration of Mileage Based User Fee Approaches for All Users," tetcoalitionmbuf.org, The Eastern Transportation Coalition, https://tetcoalitionmbuf.org/wp-content/uploads/2022/02/Eplotration-of-Mileage-Based-User-Fee-Approaches-for-All-Users-Condensed-1.pdf (22 May 2025).

increase collection costs. Current programs are also voluntary, meaning authorities do not have to devote significant resources to enforcement.

Given both the real and perceived challenges of GPS-based MBUFs, it is important that drivers have an alternative, at least initially, to the high-tech approach. The next part details current low-tech MBUF programs or pilots in operation, as well as some promising new alternatives.

> *States developing pilots with high-tech MBUFs are urged to find ways to reduce collection costs by contracting with multiple private account managers.*

3.4 SPEED OF IMPLEMENTATION

Pilot and optional permanent MBUF programs are important first and second steps. But they by themselves will not raise sufficient revenue. Most U.S. federal and state transportation funding has been based on a users-pay/users-benefit payment system. However, with fuel tax revenue decreasing, many states are starting to supplement their revenue with general fund transfers, sales taxes, and other revenue sources that don't follow the users-pay/users-benefit principle. Implementing any mileage-based user fee across a state's entire vehicle fleet is likely to take 10 years. Implementing a higher-tech option that creates more opposition due to privacy or security concerns is likely to take longer. Absent a permanent MBUF program for all, current funding that follows the users-pay principle may fail within the next 10 years. Implementing a lower-cost alternative in the interim could provide a needed bridge between the fuel tax and gold-standard MBUF programs.

PART 4

LOW-TECH MBUF OPTIONS

All current MBUF programs and pilots give participants the alternative for a low-tech option. But these lower tech options are not well known, allowing MBUF opponents to paint the technology in an unflattering light. Even in the voluntary programs, legislators and program administrators felt it critical to offer drivers an option. These low-tech options have two advantages: they have lower collection costs and are easier to implement. In most pilots/permanent programs, low-tech options have proven popular with drivers. The two most common low-tech options are a plugin device without GPS and an odometer reading.

Why might a driver want a low-tech option? Following are three possibilities:

- They might be concerned with privacy or security; or
- They could be technology-averse and prefer something that is easier to understand; or
- They might want to start with a simpler MBUF system and work their way up to something more advanced.

Why might an agency want a low-tech option? Following are three possibilities:

- They might want something with lower costs of collection;
- They want to provide a simpler option to drivers; and/or

- They may be worried about pushback from legislators.

Given the high level of demand, exactly which type of low-tech options are available today? Further, what are some other promising low-tech options on the horizon? The first two examples are being used in permanent and pilot programs today, while the final three are promising new technologies.

4.1 PLUG-IN DEVICE WITHOUT GPS

Oregon allows conventional vehicles to pay an MBUF based on a plug-and-play mileage device that records the total number of miles driven but not the time or location.[20] Virginia also allows this option in its permanent program and many of the 30 pilots tested this approach. This eliminates the privacy issue that is the biggest concern. Unlike a straight odometer reading, this type of system has other value-added services such as determining vehicle health, which some drivers want.

“Unlike a straight odometer reading, this type of system has other value-added services such as determining vehicle health, which some drivers want.”

4.2 ODOMETER READING

Drivers who want an even simpler option could opt for an odometer reading whenever the vehicle is serviced. (States that conduct annual vehicle inspections could also check the mileage at that time.) That would eliminate the need for any in-vehicle device or government type of mileage reporting. Typically, vehicles are serviced every 3,500-10,000 miles depending on automobile brand. Mechanics keep track of the vehicle mileage so they know what types of service to perform. Many services like Carfax keep detailed vehicle

[20] “OReGO,” azuga.com, azuga, 2024. https://www.azuga.com/programs/orego (8 Feb. 2024).

histories. This allows drivers to be charged at different intervals since in surveys most drivers prefer to pay several times during the year as opposed to in one payment.[21]

4.3 PREPAID MILEAGE SYSTEM

Another option used by some other countries is a prepaid mileage fee system. For example, in New Zealand the driver purchases a license or card that permits a certain number of miles of driving based on an odometer reading at the time of purchase.[22] The license is good for 621 miles (1,000 kilometers).[23] Drivers must buy a new license by the time the mileage on their existing license is exhausted. Heavy vehicles buy a second license or a different type of license. There are different licenses depending on vehicle type and weight. In the prepaid system, regardless of license and type, no vehicle location information is collected.

> *"In the prepaid system, regardless of license and type, no vehicle location information is collected."*

4.4 CELL PHONE APP

A final option that is being studied, but has not yet been implemented, is to use a cell phone app. Many drivers have privacy concerns with GPS-enabled transponders but not with cell phones, even though cell phones also have GPS chips. Private account managers could work with cell phone service providers to allow phones to serve as the in-vehicle transponder, allowing drivers with privacy concerns (about plug-in devices but not cell phones) to participate without traditional plug-in onboard devices. However, cell phone

21 "Exploration of Mileage-Based User Fee Approaches for All Users," tetcoalition.org, The Eastern Transportation Coalition, February 2022; https://tetcoalitionmbuf.org/wp-content/uploads/2022/02/Exploration-of-Mileage-Based-User-Fee-Approaches-for-All-Users_Fact-Sheet-1.pdf 8 Feb. 2024.

22 Robert Kirk and Marc Levinson, "Mileage-Based Road User Charges," Congressional Research Service, crs.gov, 22 June 2016. https://sgp.fas.org/crs/misc/R44540.pdf (1 July 2023).

23 "About RUC," Waka Kotahi, nzta.govt.nz, 2024. https://www.nzta.govt.nz/vehicles/road-user-charges/about-ruc/ (8 Feb. 2024).

pilots have been problematic. Cell phones do not have reception in all areas. Cell phone batteries can go dead, and not all drivers have cellphone car chargers. After conducting focus groups, transportation agencies became concerned that drivers would turn on/off the cell phone and remove the chip in an attempt to avoid payment.[24] However, other experts believe cell phones paired with a back-up device could be a promising option. Ultimately, the viability of cellphones may come down to whether drivers can be trusted to use MBUF systems as designed.

4.5 ON-BOARD TELEMATICS SYSTEM

Most vehicles built today have an on-board telematics system that automatically records vehicle mileage. Using such a system would eliminate the need for plug-in devices, odometer readings, or prepaid mileage cards. Access to on-board telematics is considered the crown jewel of high-tech MBUF systems. However, the automotive industry is vehemently against using these systems for revenue collection purposes, as they worry that drivers would associate automakers with taxes and potentially interfere with other customer commitments.[25] It should be noted that many automakers currently charge a monthly or annual fee for navigation or other value-added services.[26] While automaker opposition complicates development of this option, there are third-party Application Programing Interfaces (APIs) that can leverage in-vehicle telematics without automaker support.[27] The challenge is these APIs can have a high cost of collection. But they could be a work-around that allows usage of in-vehicle telematics.

[24] "Privacy Concerns in a Mileage Based User Fee System," tetcoalitionmbuf.org, The Eastern Transportation Coalition, March 2019. https://tetcoalitionmbuf.org/wp-content/uploads/2020/07/Coalition-MBUF-Privacy-Tech-Memo_2019.pdf 23 Feb. 2024.

[25] "Mileage Based User Fee Pilot," tetcoalitionmbuf.org, I-95 Corridor Coalition, Mar 2019. https://tetcoalitionmbuf.org/wp-content/uploads/2020/07/Coalition-MBUF-Privacy-Tech-Memo_2019.pdf (22 May 2025).

[26] Brad Anderson, "BMW Doubles Down on Paid Subscriptions in the USA, Charges $105 a Year for Remote Engine Start," https://www.carscoops.com/2023/01/bmw-now-offering-more-feature-subscriptions-in-the-u-s/, https://www.usatoday.com/story/tech/columnist/komando/2022/12/15/do-your-homework-before-signing-up-car-subscription-based-services/10882060002/

[27] Winona Rajamohan, "Privacy, Practicality, Production: Scaling Road Usage Charge with Car APIs," smartcar.com, Smartcar, 10 Nov 2021. https://smartcar.com/blog/road-usage-charge-car-api (22 May 2025).

PART 5

RECOMMENDATIONS

With the fuel tax decreasing as a reliable source of highway revenue, implementing an alternative in the near future is critical. MBUFs are the most promising successor and the best current option to implement. However, given the concerns over privacy, security, costs of collection, and speed of implementation, not all drivers are comfortable with a GPS-based MBUF system at this time. Therefore, policy leaders should consider the first five options described in Part 4: Non-Location Based MBUFs, Supplementary Highway Fees, Odometer Readings, Prepaid Mileage System, Cell Phone App, and On-Board Telematics.

A non-location-based MBUF directly addresses privacy concerns. An odometer reading is the simplest method, and the reading can be conducted during a vehicle inspection or routine vehicle maintenance. A prepaid mileage system is another intriguing option, especially for drivers who know how many miles they will travel or for the unbanked. Cell phones offer a potentially useful option, since they are ubiquitous among drivers, although challenges remain such as ensuring that the driver's cell phone is read and ensuring a back-up if a cell-phone loses power or fails. Finally, on-board telematics would be the gold standard if APIs become cost-effective.

While none of these four is the traditional gold standard, location-based MBUF system, any of them could be a realistic alternative. But offering them among a menu of options allows authorities to use a carrot instead of a stick to make an MBUF pilot or permanent program attractive to as many folks as possible.

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Feigenbaum has a diverse background researching and implementing transportation issues including revenue and finance, public-private partnerships, highways, transit, high-speed rail, ports, intelligent transportation systems, land use, and local policymaking. Prior to joining Reason, Feigenbaum handled transportation issues on Capitol Hill for Rep. Lynn Westmoreland.

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