GAS TAX ALTERNATIVES: MILEAGE-BASED USER FEES

THE UNIVERSITY OF ALABAMA | Alabama Transportation Institute

Historically, federal surface transportation programs have been funded primarily through taxes on motor fuels.[1, 2] However, the fuel tax system may not be a sustainable source of funding in the long run because of a projected decrease in energy consumption[3] due to improving fuel efficiency,[4] increasing use of electric vehicles,[5] and growth in the number of vehicle miles traveled (Figures 1-3).[6]

Figure 1: Projections for U.S. Transportation Fuel Consumption, 2018 – 2050, Trillion BTU. Source: EIA

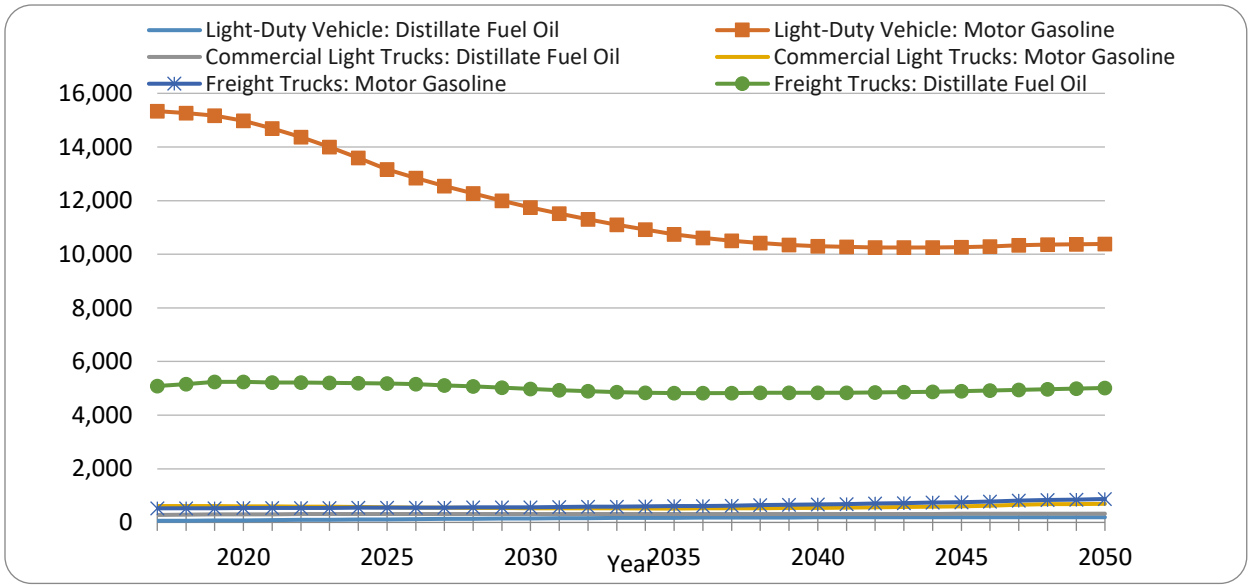


Figure 2: Annual vehicle miles traveled in the U.S., Millions. Source: EIA

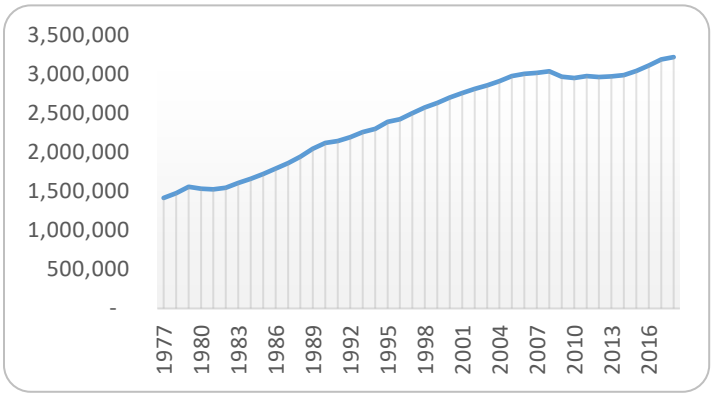
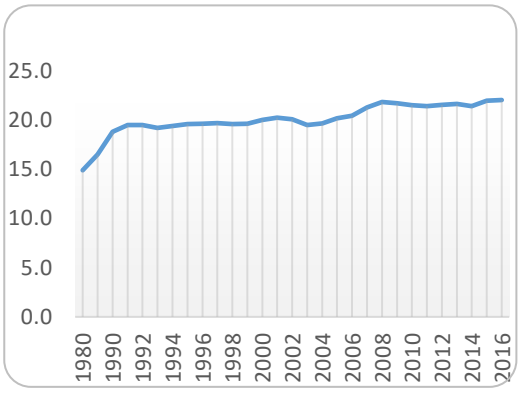


Figure 3: Average Fuel Efficiency of U.S. Light-Duty Vehicles, Miles per Gallon, 1980-2016. Source: EIA



To address the concern about declining transportation system funding, many states have made efforts to diversify funding sources and invest in alternative sustainable funding systems less dependent on fuel taxes. The mileage-based user fee (MBUF) system (also referred to as "road usage charge" or RUC) is a possible solution.[7] MBUF is charged based on the distance traveled, as opposed to the gas tax that is charged based on the amount of gasoline purchased.[8] To date, a variety of mileage-reporting methods have been developed (Table 1) that can be classified into two categories: manual and automated mileage reporting.[9] Some of these may only be at their design stages and may not be available to drivers in all the states that are currently testing MBUF programs.

Table 1: Mileage tracking methods[10, 11]

Tracking Option	Description	Pros	Cons
I.	**Manual Reporting Methods**		
Time permit	Allows for unlimited driving during a specified time period (e.g. 10, 30, or 90 days).	Single-payment method. No reporting obligations. No associated privacy concerns because there is no need for sharing of a driver's location information.	High cost of permits: the price corresponds to 95th percentile of driving amount over the specified time period (purchasers are likely to pay for more miles than they use).
Mileage permit	Pre-payment for a specified block of miles (e.g. 1,000, 5,000 or 10,000 miles). Odometer verification at the time of purchase is needed to ensure that drivers drive within the specified mileage. Odometer readings may be done at specified locations, or online via a smartphone app.	Low administrative costs. No associated privacy concerns as there is no need for sharing of a driver's location information.	Potential inconvenience to drivers due to the need to estimate expected date of the permit's expiration to ensure timely purchase of a new permit. Mileage permit does not distinguish between chargeable and non-chargeable miles.
Odometer	Requires a driver to regularly self-report and post-pay for miles traveled. Odometer readings could be done in-person or through the OdoCheck App, the smartphone application that allows users to report mileage using odometer images.	No additional equipment requirements. Low administration costs. No associated privacy concerns as there is no need for sharing of a driver's location information. Can be combined with annual registration or inspection.	Not all states require registration/inspection. Does not distinguish between chargeable and non-chargeable miles. Potential for fraud such as manual manipulation of odometer measurements.

Tracking Option	Description	Pros	Cons
II.	**Automated Reporting Methods**		
Non-GPS-enabled On-Board Computer Unit (OBU)	Connected to on-board diagnostic port. Able to compute miles traveled. Would need to include electronic communication to transmit miles traveled for inspection.	Would be compatible with most cars on the road. No need for sharing of a driver's location information. No need for periodic vehicle mileage inspections.	Administrative costs are higher than those of manual mileage reporting methods due to the need to install additional equipment in vehicles.
OBU with GPS or cellular technology	Connected to on-board diagnostic port Able to compute miles traveled, identify the jurisdiction traveled, distinguish between chargeable and non-chargeable miles, and record the time of the trip.	Would be compatible with most cars on the road. Ability to identify the time of travel and a driver's location allows avoiding charges for non-chargeable miles and applying different rates depending on the time of the day and traffic lane used in order to reduce traffic congestion. No need for periodic vehicle mileage inspections.	Privacy concerns due to the device's ability to track a driver's location. Administrative costs are higher than those of manual mileage reporting methods due to the need to install additional equipment in vehicles.
Non-GPS enabled smartphone app	Uses cell communications to meter mileage. Users may be required to submit an image of their Vehicle Identification Number (VIN) upon enrollment to prevent potential fraud in reporting.	This method would be compatible with any type of vehicle. No need to install additional technology in the vehicle. Lower administrative costs compared to OBUs.	Potential for fraud such as manual manipulation of odometer measurements, and disabling devices when driving. Additional costs to ensure drivers' compliance with the system. Drivers are required to periodically submit images of odometer measurements.
GPS-enabled smartphone app	Trip information is collected and reported using a smartphone app. Drivers may have to periodically submit pictures of the odometer as a back-up for the smartphone app's mileage tracking algorithm.	This method would be compatible with any type of vehicle. No need to install additional technology in the vehicle. Lower administrative costs compared to OBUs . Ability to identify the time of travel and a driver's location allows avoiding charges for non-chargeable miles and applying different rates depending on the time of the day and traffic lane .	Additional costs to ensure drivers' compliance with the system (drivers may intentionally keep their cell phones out of the vehicle or disable devices when driving). Privacy concerns due to the device's ability to track a driver's location.

Tracking Option	Description	Pros	Cons
In-vehicle telematics	Built-in technologies that allow for transmission of vehicle data to a web-based system administered by the car manufacturer. Telematics systems are not typical for older vehicles but are common in new cars and are expected to be present in the majority of new cars by 2020.	This method would not require any additional equipment. Lower administrative costs compared to OBUs. Ability to distinguish between chargeable and non-chargeable miles (such as out-of-state, private and off-road miles).	The need to obtain permission for the use of in-vehicle telematics data from car manufacturers. Privacy concerns due to the device's ability to track a driver's location.
Commercial vehicle electronic logging device	Measures distance traveled by commercial vehicles.	Contains a number of security features that make it extremely difficult to remove or disable the device.	Requires professional installation and is therefore associated with additional administrative costs.
III.	**Alternative to MBUF**		
Fixed fee	Fixed fee is collected at the time of vehicle registration as an alternative to mileage-based user fee.	Low administrative costs.	High-mileage drivers may choose to pay fixed fee and low-mileage drivers may choose to pay by the mile. This may result in a reduction in revenues.

Several states have conducted pilot programs to study MBUF feasibility (Table 2).[12] In 2015, the Fixing America's Surface Transportation (FAST) Act included funding to explore the practicability of MBUF.[13] Pilot study sponsors include the state of Oregon, the Western Road-Usage Charge Consortium (RUC West), and the I-95 Corridor Coalition.

RUC West includes 14 member states in the midwest, west, and southwest regions. The RUC West states can be divided into three tiers (Figure 4):

- **Tier 1** (states with a policy in place to implement a RUC program): Oregon.
- **Tier 2** (states currently testing the RUC pilot program): California, Colorado, Hawaii, Washington, and Utah.
- **Tier 3** (states currently researching RUC): Arizona, Idaho, Montana, Nevada, New Mexico, North Dakota, Oklahoma, Texas.

The I-95 Corridor Coalition (Figure 5) is a collaboration of 16 states on the East Coast (Maine, New Hampshire, Vermont, Massachusetts, Connecticut, Rhode Island, New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, North Carolina, South Carolina, Georgia, Florida), the District of Columbia, and Canadian province New Brunswick.[14] The Coalition's members include state and local departments of transportation, public safety and transportation agencies, fire rescue departments, and toll authorities.

Figure 4: Western Road User Charge Consortium

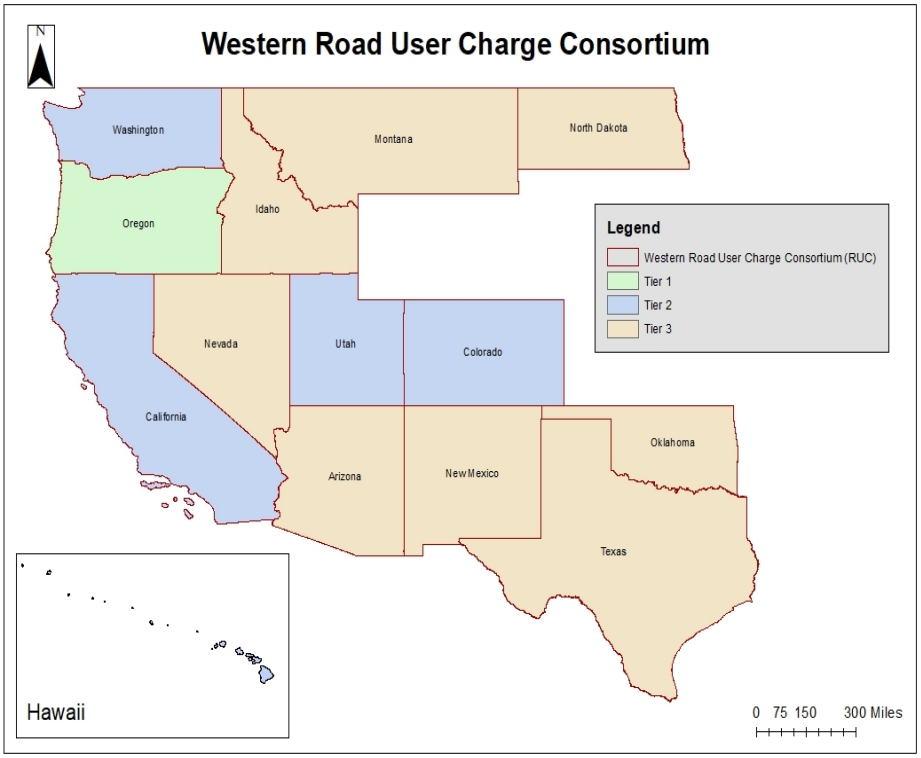


Figure 5: I-95 Corridor Coalition

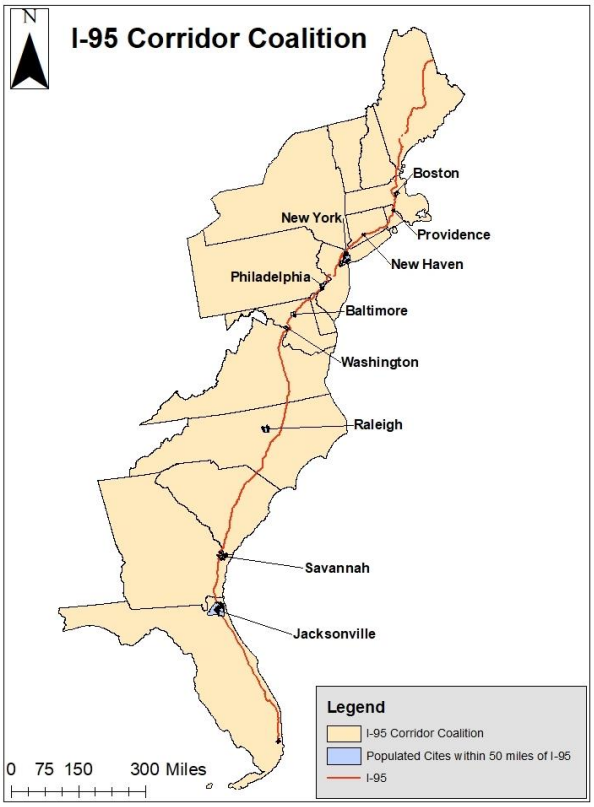


Table 2: Overview of MBUF Studies in the US

Location and Dates	Study Description	Key Findings and Status
OReGO,[15] Oregon Department of Transportation, July 2015 - present	The program's volunteers self-install a tracking and reporting device in their vehicle and are charged 1.5 cents per mile driven. The volunteers are given the option of a GPS-tracking device or a non-GPS tracking device. As of 2017, OReGO had 1,300 vehicles enrolled.	The study examined public concerns regarding unfairness of MBUF with regards to rural and low-income drivers and found these concerns to be unsubstantiated. The study found that under the MBUF system, higher-income individuals may pay more than lower-income individuals because they drive further than lower-income individuals. According to the pilot's findings, urban drivers are more likely to drive more fuel-efficient vehicles, and therefore, they would pay more under the MBUF program than they pay now in gas taxes. At the same time, rural drivers are more likely to drive less fuel-efficient vehicles than urban drivers, and therefore, pay about the same amount using the MBUF system as they pay now in gas taxes.
Western Road-Usage Charge Consortium (RUC West),[16] April 2017 – Present	The objective of the project has been to help better understand RUC West member states' needs for the mileage-based charge program.	Over the course of the project, a number of written reports have been produced presenting findings about feasibility and interoperability of the RUC system, the RUC program's progress, and the effects of the MBUF system on rural and urban residents.
California Road Charge Pilot Program,[17] CalTrans, July 2016 – March 2017	The program involved 5,129 vehicles including private vehicles (85%), light commercial vehicles (5%), heavy commercial vehicles (1%), and other vehicles (7%). Drivers reported miles traveled, paid a simulated road charge for each mile driven, and provided feedback. The program represented different socio-economic groups and offered both manual and automated reporting methods. Manual reporting methods included time permits (10, 30, or 90-days), mileage permits (1,000, 5,000, or 10,000 miles), and odometer charge (self-reported by drivers quarterly). Automated methods included smartphone apps, on-board diagnostic mileage meters with and without built-in GPS system, and in-vehicle telematics. Two different per-mile rates for light and heavy diesel vehicles: 1.8 cents/mile and 35.4 cents/gallon fuel tax credit for light vehicles, and 1.8 cents/mile and 11.4 cents/gallon fuel tax credit for heavy diesel vehicles.	78% of participants of the pilot were satisfied with the data privacy throughout the program. Participants associated the manual mileage reporting option with the highest level of data privacy. GPS-enabled OBUs and telematics were perceived as easy to use by the highest percentage of drivers (97% of drivers who chose GPS-enabled OBUs) while time permit was perceived as an "easy reporting method" by the smallest proportion of drivers (86% of drivers who chose time permit. The majority of participants were satisfied with the level of data accuracy throughout the program, and this number has increased over the course of the program (67% mid-pilot and 83% at the end of the pilot). The most common issues reported over the course of the project included the difficulty in choosing an account manager, issues related to a driver's account and activation code, and general questions about the pilot program.

Location and Dates	Study Description	Key Findings and Status
Colorado Road Usage Pilot Program,[18] Colorado Department of Transportation, November 2016 – July 2017	RUCPP was Colorado's first effort to test the per-mile road usage payment system. The pilot included approximately 150 participants from 27 different Colorado counties. Over the course of the pilot program, the MBUF technology was tested on vehicles with a range of fuel efficiency rates and types, including gas, hybrid and electric vehicles. Participants were provided with the following mileage reporting options: odometer reading (chosen by 13% of participants), a non-GPS-enabled OBU (selected by 18% of participants), and a GPS-enabled device (selected by 69% of participants). Only the GPS-enabled OBU method allowed for differentiation between in-state and out-of-state mileage using GPS system.	Among all reporting options used in the pilot, the mileage-reporting device (MRD) (including both GPS-enabled and non-GPS-enabled devices) generated the highest level of satisfaction among participants (over 90%). The odometer reading method was associated with the smallest proportion of satisfied participants (55%). One of the important take-always of the pilot program was that a monthly road-usage fee (about $10 for the majority of participants) was perceived to be smaller than expected and was less than what most participants expected to pay. Finally, pre-pilot, mid-pilot and post-pilot surveys showed that the majority of respondents (93%) saw the program as a positive experience and that the level of satisfaction with data security and accuracy increased over the course of the program.
Washington Pilot Project,[19] Washington State Transportation Commission (WSTC), February 2018 – January 2019	The program tested for interoperability between RUC West member states in order to enable efficient revenue collection from the cross-border and interstate travel. About 2,000 drivers have participated in the Washington Pilot Project to date. The pool of participants includes drivers from different racial, income, age, and gender groups. Over the course of one year, more than 16 million miles were reported and mock-charged at the flat rate of 2.4 cents per mile. This is equivalent to the average per-mile spending of a Washington driver via state fuel tax, assuming the 20.5 miles per-gallon efficiency. Similar to other pilot programs conducted by the RUC West Coalition's member states, Washington's MBUF project offered participants five mileage reporting options including automated mileage-tracking OBUs (chosen by 55% of participants), a smartphone app with GPS-enabled and non-GPS-enabled modes (chosen by 15% of participants), odometer reading with quarterly post-pay for miles driven (chosen by 29% of participants), and mileage permits for 1,000-, 5,000- and 10,000-mile blocks (chosen by 1% of participants).	The results of the pilot are currently being analyzed to establish final findings and recommendations.

Location and Dates	Study Description	Key Findings and Status
I-95 Corridor Coalition,[20] Delaware Department of Transportation, May – July 2018 (Phase 1) and October 2018 – Present (Phase 2)	155 participants volunteered for the pilot, including transportation industry representatives from 13 of the Coalition's member states, local officials, and toll authorities. Participants were provided with three alternatives for mileage reporting: a GPS-enabled plug-in device (selected by 76% of participants), a non-GPS-enabled plug-in device (selected by 16% of participants), and a GPS-enabled smartphone app.	The pilot confirmed the importance of addressing concerns regarding out-of-state mileage by showing that 20% of miles driven during Phase 1 of the pilot were outside participants' home states. Over the course of the program, data privacy concerns have dropped from 57% to 30%. Out of all value-added amenities used in the pilot program, vehicle health monitoring and battery voltage monitoring have been shown to be the most valued.

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[17] See California State Transportation Agency supra note 3
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Acknowledgements

This report was prepared by Olga A. Bredikhina, Justin W. Fisher, Bouran S. Mozayen, and L. Melissa Wheeler for the Alabama Transportation Institute at the University of Alabama.

Produced by the Transportation Policy Research Center, a unit of the Alabama Transportation Institute.