THE EASTERN TRANSPORTATION COALITION

Exploration of Mileage-Based User Fee Approaches for All Users

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CONTENTS

Acronyms and Abbreviations

2020-2021 MBUF Work	The Eastern Transportation Coalition's work funded by the Surface Transportation System Funding Alternatives program and occurring during 2020 and 2021
2020-2021 State Passenger Vehicle Pilot	Demonstration pilots in Delaware, New Jersey, North Carolina, and Pennsylvania conducted in partnership with state departments of transportation
DOT	Department of Transportation
ETL	Express Toll Lanes
EV	Electric Vehicle
FET	Federal Excise Taxes
FHWA	Federal Highway Administration
GNSS	Global Navigation Satellite Systems
HOT	High Occupancy Toll
HTF	Highway Trust Fund
HVUT	Heavy Vehicle Use Taxes
ICE	Internal Combustion Engine
IFTA	International Fuel Tax Agreement
IRP	International Registration Plan
LATCH	Local Area Transportation Characteristics for Households
LEHD	Longitudinal Household Dynamics
LM	Large Metropolitan
MBUF	Mileage-based user fee
MCWG	Motor Carrier Working Group
MPG	Miles Per Gallon
PHEV	Plug-in-hybrid vehicles
RUC	Road Usage Charge
RUC West	Western Road Usage Charge Consortium
STSFA	Surface Transportation System Funding Alternatives
TETC	The Eastern Transportation Coalition
TOD	Time of Day
VMT	Vehicle miles traveled
vPIC	National Highway Transportation Safety Administration Produce Information Catalogue and Vehicle Listing
WDT	Weight Distance Tax


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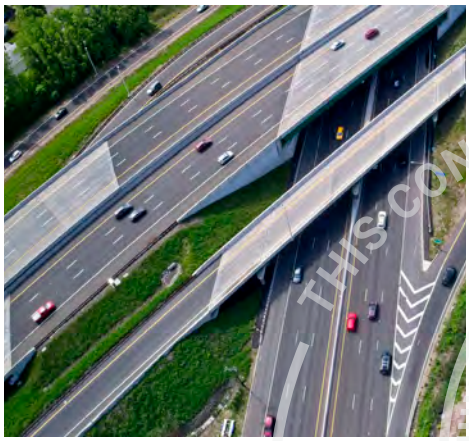
01 Introduction



1.1 The Need for Sustainable Funding

We depend on America's highways and bridges to take us to work and school, provide access to opportunities, and transport the goods and services our economy needs to thrive. Well-maintained transportation infrastructure helps us get where we need to go safely. The COVID-19 pandemic underscored the necessity of a strong transportation network even more. Without our highways and bridges, we could not keep our grocery stores stocked, have packages delivered to our front doors, or get to the doctor. Unfortunately, the fuel tax model we currently use to fund this transportation system isn't sustainable.

Since the introduction of the fuel tax, vehicle fuel efficiency has changed dramatically, with vehicles going farther on less fuel and some vehicles not paying for fuel at all. Though this has been great for wallets and the environment, it has presented a challenge for the transportation system that depends on these funds. As vehicles become more fuel efficient, they contribute less revenue to build and maintain roads, yet continue to contribute to wear and tear as well as congestion. As Figure 1-1 illustrates, there has been a steady decline in federal fuel tax generated per mile over the last 25 years. In short, the linkage between road use and payment is broken.

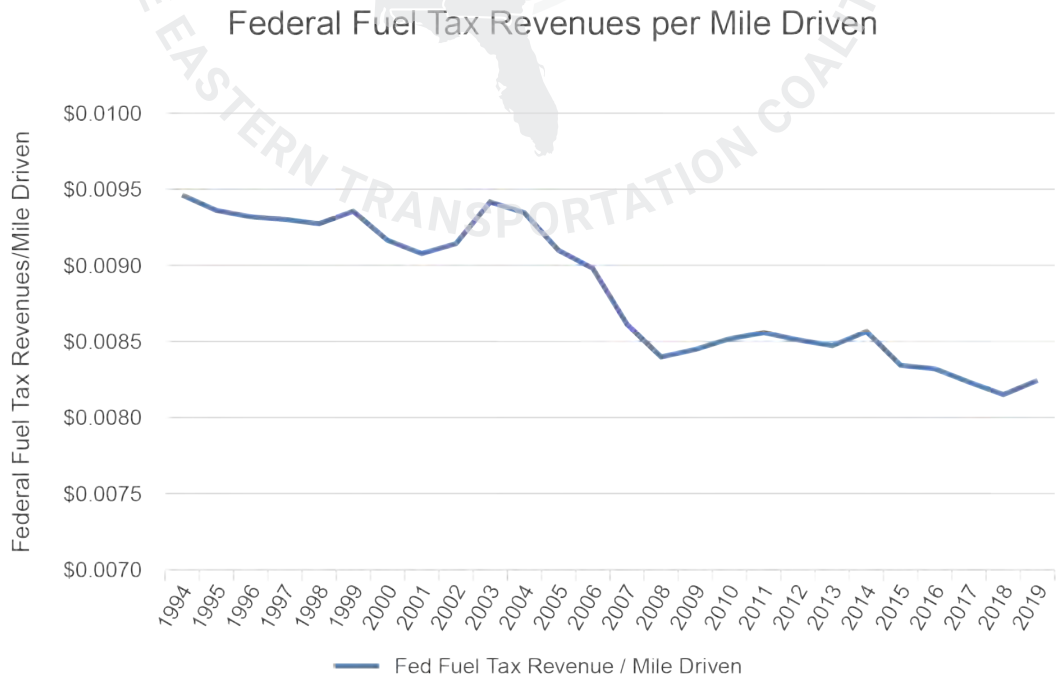


Figure 1-1: Federal Fuel Tax Per Mile Driven

(Note: Data from Bureau of Transportation Statistics used in calculations)

To re-establish the connection between how much a driver uses the road and how much they pay for it, state and federal governments are exploring a distance-based approach to transportation funding—referred to as a mileage-based user fee (MBUF) and also known as a road usage charge (RUC)—as an alternative to the fuel tax. Unlike the pay-per-gallon approach, an MBUF charges drivers according to the amount of miles they drive on roadways (see Figure 1-2). The assessment of MBUF has advanced as a result of the U.S. Department of Transportation Surface Transportation System Funding Alternatives (STSFA) grant program established under the Fixing America's Surface Transportation Act that provides grants to demonstrate user-based alternative revenue mechanisms that utilize a user fee structure.

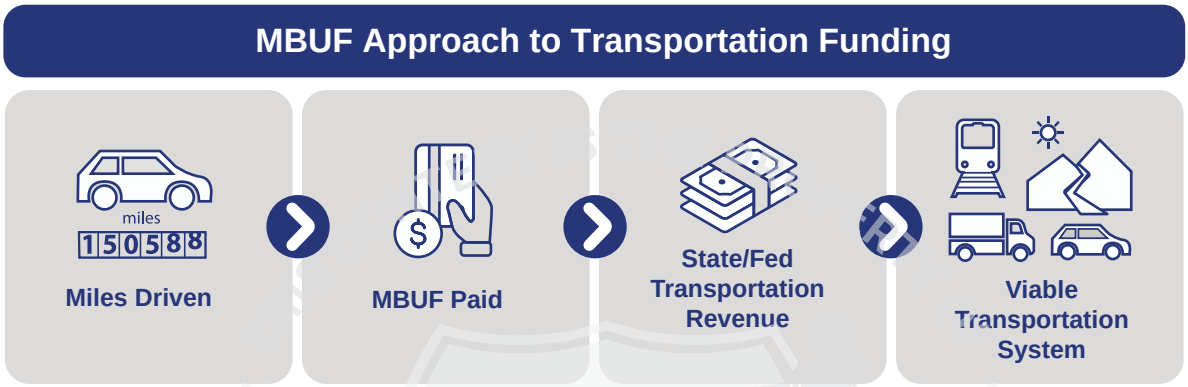


Figure 1-2: MBUF Approach to Transportation Funding

1.2 The Coalition and MBUF Research

As a partnership of 17 Eastern states and Washington, D.C., the Eastern Transportation Coalition (TETC or the Coalition) has a wide range of operating environments that create an ideal testing ground to address multi-state issues. For more than 27 years, the Coalition has brought innovative, implementable solutions to address challenges—including how to sustainably fund the transportation network. Under STSFA, the Coalition built on this foundation by bringing together multiple states to explore how replacing the fuel tax with MBUF would affect Eastern U.S. states. In turn, the Coalition's broad geographic areas, multimodal environment, numerous toll facilities, and heavily used freight corridors bring key insights into understanding the effectiveness of MBUF on a national scale.

Using STSFA grant funding, the Coalition began its MBUF exploration in 2018 to expand the national conversation around MBUF and better understand how the alternative funding mechanism impacts drivers in Eastern U.S. states. Objectives included:

- Understanding how MBUF affects drivers of passenger vehicles and trucks
- Incorporating lessons learned from the tolling industry
- Determining how MBUF technology could be leveraged for other transportation funding efforts, including tolling and congestion mitigation
- Engaging with commercial vehicle stakeholders to bring their voice into national MBUF discussions
- Engaging with the public to better understand their opinions and knowledge about transportation funding, the transportation network, and MBUF

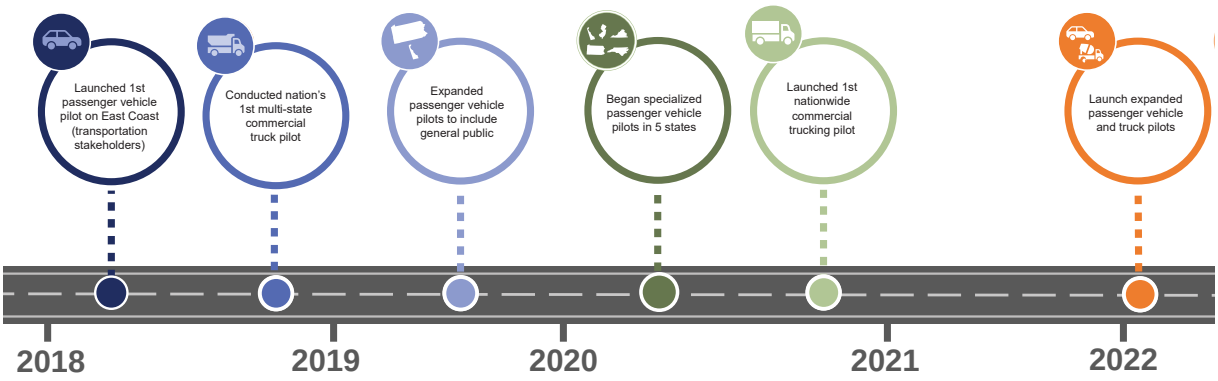


Figure 1-3: Timeline of Coalition Work Under the STSFA Grant

These pilots have included more than 1,500 passenger cars from 14 Eastern states and D.C., as well as approximately 270 trucks. Importantly, the Coalition's work takes the study of user fees from theory to practice to show how MBUF could function in an actual operating environment. Figure 1-3 shows a timeline of the Coalition's STSFA-funded work.

The central finding from nearly four years of work conducted by the Coalition is that **MBUF can be a viable alternative to the pay-at-the-pump fuel tax.** An MBUF approach would be a return to the user-based funding mechanism envisioned when the fuel tax was first implemented and fuel consumption was much more equitable among vehicles.

This report focuses on the Coalition's STSFA-funded activities that occurred in 2020 and 2021 (2020-2021 MBUF Work). The 2020-2021 MBUF Work to explore MBUF as a replacement for the fuel tax included the following:

- National Truck Pilot (Chapter 2), including:
  a. Demonstration pilot that spanned the 48 contiguous states and D.C.
  b. Tiered rate analysis
  c. Pilot participant interviews
- Motor Carrier Working Group (Chapter 3), including:
  a. Rate Setting Task Force
- 2020-2021 State Passenger Vehicle Pilot (Chapter 4), including:
  a. Demonstration pilots in Delaware, New Jersey, North Carolina, and Pennsylvania (2020-2021 State Passenger Vehicle Pilot) in partnership with state departments of transportation (DOTs)

Why MBUF? Because one of the most pressing challenges is that of funding the transportation system, which has lost the connection between how much a driver uses the road and how much they pay for it.

b. Tiered rate analysis
c. Pilot participant surveys and focus groups
d. Fuel location analysis

- Public Opinion Surveys (Chapter 5)
- Geographic Equity Analysis (Chapter 6)
- Tolling Synergies (Chapter 7), including
  a. Tolling synergies test in Delaware, New Jersey, North Carolina, and Pennsylvania
  b. 2021 Tolling Entity-Led Synergies Pilot in partnership with Transurban, a toll road operator, to explore how tolling business practices can be leveraged to implement a viable MBUF system
- Congestion Mitigation Using MBUF Technology (Chapter 8)

Chapter 9 highlights the key findings learned during this work, and Chapter 10 considers next steps for the continued exploration of MBUF. Figure 1-4 outlines the Coalition's project team, which consists of a program manager, research partners, and additional team members.

Figure 1-4: 2020-2021 MBUF Work Project Team

02 National Truck Pilot

2.1 Overview

The Coalition's 2020-2021 National Truck Pilot—the nation's first—took place from October 2020 to March 2021. The Coalition built on its 2018-2019 Multi-state Truck Pilot—also the nation's first—to achieve greater industry diversity, gain a better understanding of how MBUF would affect trucks, and determine whether MBUF presents a viable funding alternative to the fuel tax. Conducting pilots focused on the trucking industry reflects the concerns the motor carrier industry has expressed of being singled out in a future MBUF approach and the Coalition's commitment to reflecting all transportation system users in this work.

The six-month pilot included 21 diverse operators with 221 vehicles that traveled across all 48 contiguous states and Washington, D.C. The participants logged about 11 million miles, with 73% of the miles accrued outside their home states (see Figure 2-1).

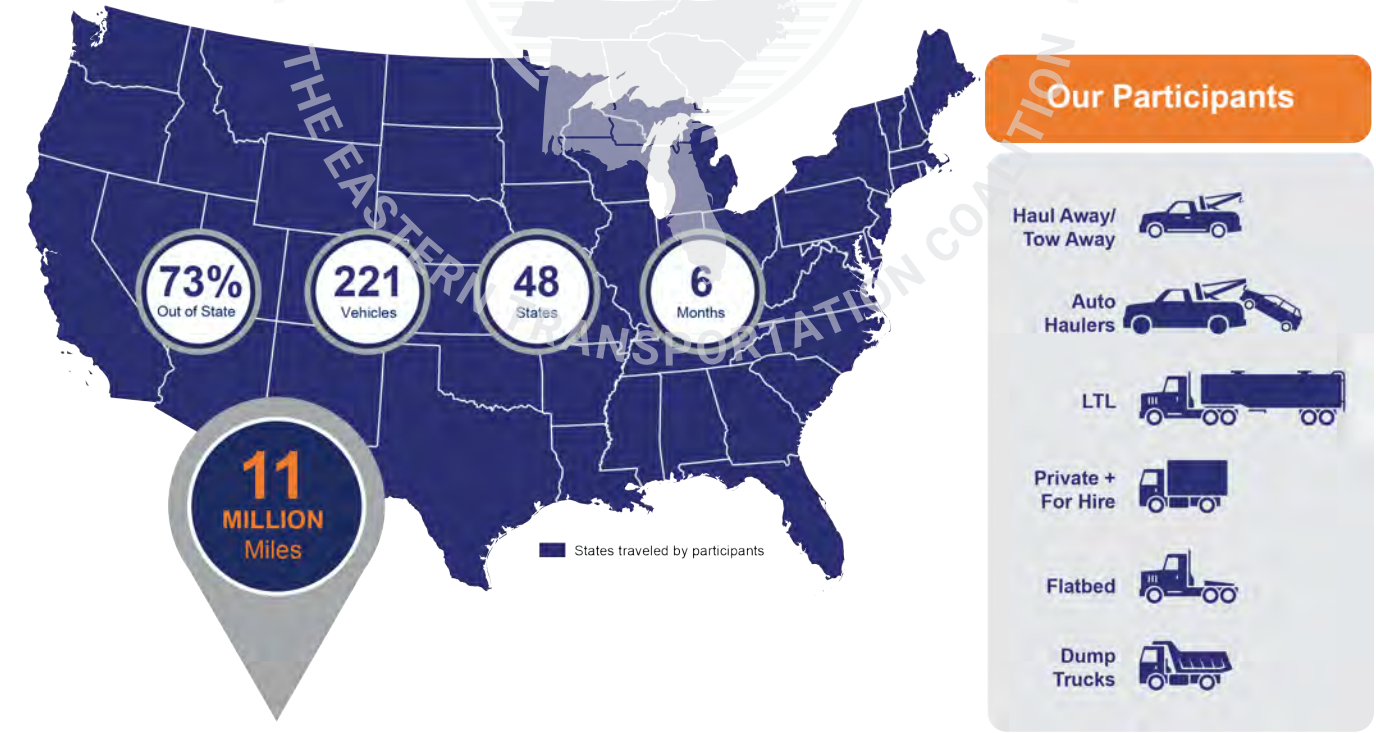


Figure 2-1: Phase 3 National Truck Pilot Overview

> "Number of miles and fuel recorded seems pretty accurate."
> - National Truck Pilot Participant

The Coalition and its research and technology partner EROAD recruited participants for this study that would achieve industry diversity, provide a better understanding how MBUF would affect motor carriers, and help determine whether MBUF presents a viable funding alternative to the consumption-based fuel tax. Recruitment efforts began in July 2020.

Figure 2-2: EROAD Telematic Device

All participants had access to the full range of value-added services provided by EROAD. The core element of EROAD's system is the secure on-board unit, which accurately collects data to provide regulatory and commercial services, including: Hours of service; electronic logging device; electronic International Fuel Tax Agreement (IFTA) and International Registration Plan (IRP) recordkeeping; and electronic Weight Distance Tax (WDT) reporting. The on-board unit also allows EROAD to provide trucking companies with tools to monitor driver performance and improve fleet management, thereby enhancing safety and operations. The same data collected by EROAD can also be used to measure and collect MBUF, as is done for the Oregon WDT.

EROAD provided and installed the telematic devices used to capture the distance traveled by each pilot vehicle (see Figure 2-2). If the participant was an existing EROAD customer, they were not charged the monthly telematics fee for units already installed in the vehicles provided during the pilot. If the participant was not an EROAD customer, the telematic device was provided (and installed) at no cost to the participant.

National Truck Pilot participants received monthly statements that included a summary of driving data for the month, including estimated fuel costs, a comparison between estimated state and federal fuel taxes paid, and estimated MBUF costs. The National Truck Pilot statement was reconfigured from the 2018-2019 Multi-State Truck Pilot to include additional information and clarity based on feedback received (see Appendix A for an example). The major changes included:

- Design & usability enhancements
- Statement frequency – monthly
- Addition of federal fuel tax and related information
- Addition of an "Understanding Your Statement" section for educational purposes
- Transportation funding 101
- Detailed information about fleet information
- MBUF rates and calculation explanation

2.2 Establishing a Tiered Rate Based on MPG

A key finding from the 2018-2019 Multi-State Truck Pilot was that one MBUF rate for all trucks will not work. Under a single, revenue neutral rate approach, trucks with the worst fuel economy would pay much less in MBUF than they pay in diesel taxes. At the same time, the most fuel-efficient vehicles are penalized, creating an unintended disincentive for purchasing lower-emission trucks. Building on these findings, the Coalition used a tiered MBUF rate approach on the four miles per gallon (MPG) range categories listed in Table 2-1.

Table 2-1 also contains a breakdown of the National Truck Pilot statistics according to the four MPG categories. The MPG rate category used for each truck was based on the average fleet MPG used for IFTA reporting, as provided during the sign-up process. The following per-mile rate calculations were established for each of the following MPG categories:

- Per-Mile Rate = State Fuel Tax/4.75 (Median MPG for the range 4.0 – 5.5)
- Per-Mile Rate = State Fuel Tax/6.25 (Median MPG for the range 5.5 – 7.0)
- Per-Mile Rate = State Fuel Tax/8.50 (Median MPG for the range 7.0 – 10.0)

To establish rates for each MPG category in every state, the second-quarter 2020 IFTA fuel tax matrix was used to obtain the diesel tax rates. The MBUF rate for federal and state are detailed in Appendix B.

Table 2-1: National Truck Pilot Statistics by Average IFTA Fleet MPG Category

MPG Categories	< 4 MPG	4 - 5.5 MPG	5.5 – 7.0 MPG	7 – 10 MPG	Totals
Share of Truck Pilot Vehicles	0	14%	63%	23%	
Median MPG Range for Rate Setting	N/A	4.75	6.25	8.50	
Number of Companies	0	4	12	5	21
Number of Vehicles	0	32	138	51	221
Share of Pilot Vehicles	N/A	14%	63%	23%	100%
Age of Vehicles (Average)	N/A	1.88	3.85	2.06	3
# of States Traveled (Average)	N/A	13	25	27	22
Total Miles Traveled	0	1,531,945	7,408,987	2,056,870	10,997,802

As Figure 2-1 illustrates, participants in the National Truck Pilot represented a wide range of sector and geographic diversity, including transportation logistic companies, agriculture, auto haulers, truckload, private, and for-hire fleets. However, over the course of the pilot, it was identified that there was little diversity of vehicle types, with the majority of the participating trucks being 5-axle, 80,000-pound, Class 8 vehicles. In addition, no vehicles fell into the fourth MPG category (0 – 4 MPG). In future pilots, the Coalition will seek companies with multiple fleet operational types, weights, and fuel types to expand vehicle diversity.

2.3 National Truck Pilot Participant Feedback

To assess participants' experience during the pilot and gather lessons learned on how MBUF could be implemented, the Coalition conducted interviews with a quarter of the National Truck Pilot participating companies. These participants were asked to rate the topics shown in Figure 2-3 based on the level of importance. All interviewed participants viewed reporting simplicity and convenience as issues of great importance. Additionally, all National Truck Pilot participants rated data accuracy and data collection for IFTA/IRP purposes as being important or very important, and most participants expressed satisfaction with the mileage reporting accuracy of their devices. Finally, a majority of participants (80%) indicated that value-added services are important features in an MBUF model (see Figure 2-3).

"The concern across the industry in trucking is fairness and whether they are going to impose one thing on one industry and not on another. Have to look across industry...and implement across the board."
- National Truck Pilot Participant

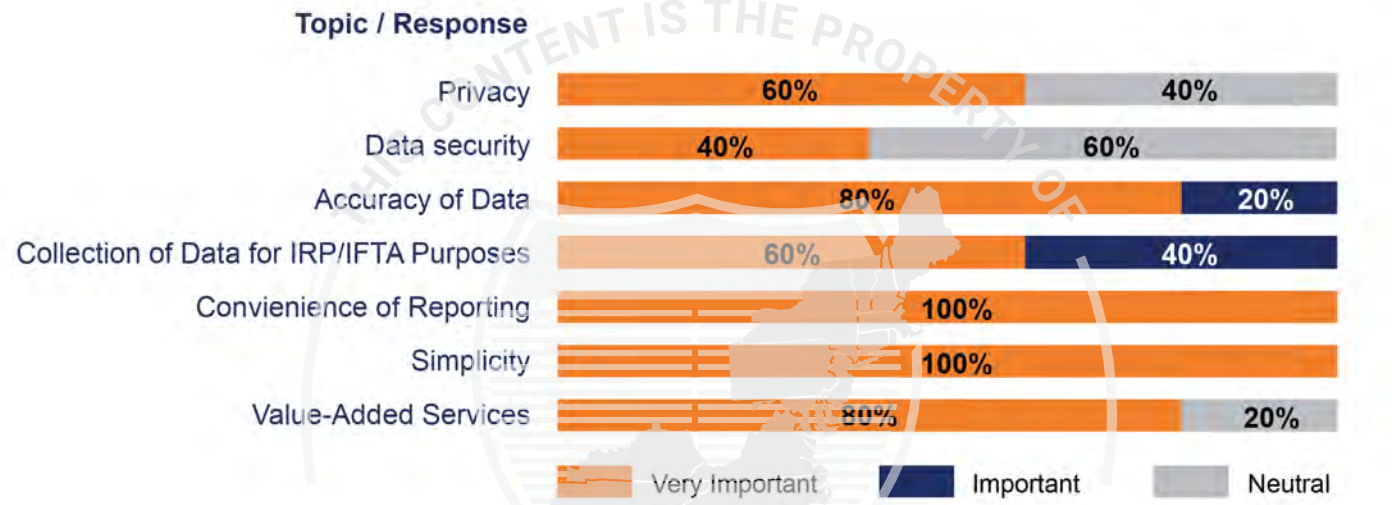


Figure 2-3: National Truck Pilot Participant Feedback

03 Motor Carrier Working Group

3.1 Overview

The Coalition recognizes the importance of including all transportation users in determining how sustainable funding can be achieved. Because the motor carrier industry are heavy users and payers of the transportation system, insight from this industry is key to understanding how MBUF would affect motor carriers.

Despite its large contribution to roadway funding—and despite the fact that roads are truckers' workplace—the motor carrier industry was not actively included in national MBUF discussions until the TETC's 2018-2019 Multi-State Truck Pilot. In 2019, the Coalition solidified its commitment to keeping truckers engaged in MBUF exploration by forming a Motor Carrier Working Group (MCWG) comprised of key stakeholders from major trucking associations, regulators, shippers, trucking companies, regulators, and trucking manufacturers (see Figure 3-1). The creation of a MCWG ensures stakeholders are not only at the table, but that they are an integral part of the discussion, providing valuable insight and recommendations as the pilot work and exploration of highway funding alternatives continues. Involvement in the MCWG does not equate to support of MBUF, but rather a desire to raise concerns and come up with potential solutions that minimize unintended consequences, reporting burdens, and regulatory hurdles for truckers. Due to the sensitivity of the MBUF conversation, the Coalition has not identified the actual members assisting with the research.

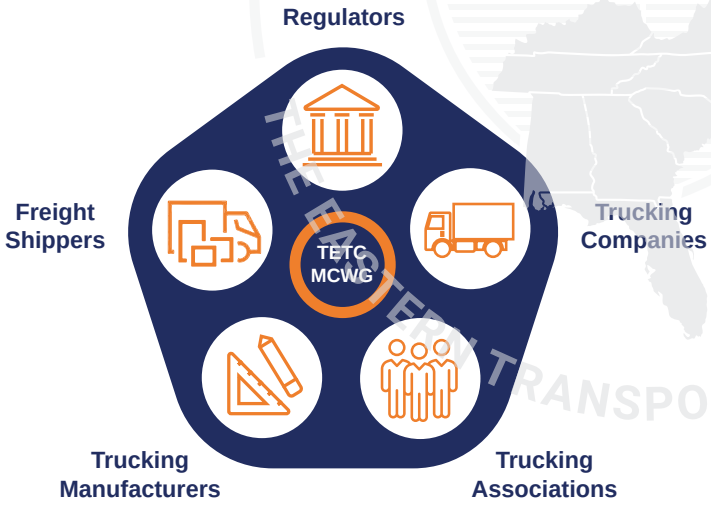


Figure 3-1: The Eastern Transportation Coalition Motor Carrier Working Group

3.2 MCWG Insights

The MCWG met twice during the 2020-2021 MBUF Work. In February 2021, the MCWG received an overview of the first national truck MBUF pilot and reviewed the preliminary analysis of an MPG-based MBUF rate setting approach. The group also reviewed the pilot's monthly statement, an important communication piece sent to each participating motor carrier that shows estimated monthly MBUF cost against estimated monthly fuel tax cost. The MCWG members who were also in the pilot shared that statement data was accurate and illuminated some of the policy's ultimate questions and concerns. Participants noted that the statement's layout was clear and easy to understand.

> "Start taking away complexities associated with other fees and regulations for the industry to get on board with MBUF."
> - Motor Carrier Working Group Participant

During the February discussion, **the MCWG recognized the shortcomings of setting the MBUF using only fuel efficiency, or MPG**, as a factor because this approach would penalize more fuel-efficient fleets and reward fuel-inefficient fleets. The MCWG also highlighted that MPG will not be a sustainable factor as future trucks make greater use of alternative fuel and power sources like hydrogen and electric. In acknowledgment of that finding, the MCWG decided to form a Rate Setting Task Force to look at alternative rate setting options for future pilots and report back to the full MCWG.

The Rate Setting Task Force met twice in 2021 to evaluate existing WDT models, discuss what other fees could potentially be consolidated through MBUF, what factors should be considered in MBUF rate setting, and to bring findings and suggestions back to the full MCWG for discussion. Some of the key considerations from the Rate Setting Task Force included:

- Keep rate setting simple
- Using registered weight for rate setting may be a better approach than MPG
- If weight is used, a uniform weight table should be established for states to adopt for ease of reporting; the framework should allow rates to be set according to state needs
- Consider all commercial motor vehicles (intra and interstate operations) beginning at 10,001 pounds
- Utilize quarterly reporting
- Keep reporting fleet based versus individual vehicle based

Another key topic raised by the MCWG was the need for policymakers to understand and leverage existing regulatory frameworks. Prior Coalition work conducted in 2018-2019 showed that for commercial vehicles, IFTA and IRP may offer foundational frameworks upon which payment, compliance, and enforcement efforts can build. However, there are knowledge gaps that exist with regards to how IFTA and IRP work, what data is collected, and what vehicles fall under each system. To address the gap in knowledge, the 2020-2021 MBUF work included development of a technical memorandum outlining the history of both IFTA and IRP, how states came together to form uniform agreements, and how the IFTA and IRP frameworks could advance the implementation of MBUF. The Rate Setting Task Force stated that education and outreach are imperative to bring lawmakers and motor carriers together for long-term solutions. The temporary or independent state solutions threaten the ease of interstate commerce that IFTA and IRP have established and pose the biggest risk to the Motor Carrier Industry. In future work, the Coalition will test the feasibility of incorporating MBUF into the existing IFTA and IRP systems.

The MCWG guidance and feedback was critical to the design and execution of the Coalition's truck pilots and work as a whole. Points continually raised include the following:

- **Fairness is key.** Participants indicated a strong belief that an MBUF system should not single out trucks, which already pay a number of local, state, and federal taxes to offset their heavy use of roads.
- **Compliance and enforcement are essential.** Participants stated that effective system compliance and enforcement are essential to ensuring everyone pays their fair share, and that IFTA and IRP may offer a foundation on which to build.
- **Truckers want funding increases to focus on roads and bridges.** Participants expressed a strong belief that any funds collected from an increase in fuel tax or MBUF should be spent on the trucker's workplace: roads and bridges.
- **An MBUF approach must recognize the distinctions within the trucking industry.** Participants highlighted the important distinctions among trucks in terms of business model, weight, size, miles driven, and amount currently paid to support the transportation network.
- **Defining and justifying the tax/fee burden placed on commercial vehicles is critical for industry acceptance.** Fair and transparent rate setting will be one of the key factors for successful MBUF implementation for commercial vehicles, as it ensures everyone pays their fair share for highway use and understands how those rates were set and why they differ between various groups. Participants expressed that any MBUF approach needs to consider the differences between users when setting rates.
- **Any transportation funding change should simplify the trucking industry's complex regulatory and reporting requirements.** In general, trucking is a complex and competitive business with relatively low margins, MCWG participants indicated. To avoid adding to this complex regulatory landscape, participants suggested utilizing a straightforward approach to rate setting and integrating MBUF with taxes and fees already imposed on the industry, such as IFTA and IRP. Additionally, participants suggested consolidating WDTs, Federal Excise Taxes (FET), registration fees, and the Heavy Vehicle Use Taxes (HVUT). Consolidating regulations and reporting requirements will not only reduce administrative costs for the government and industry alike, but will also simplify compliance and enforcement.

Understanding the complexities and fees already paid by the trucking industry matters. Existing frameworks like IFTA and IRP may be leveraged. It is important for policymakers to consider these unique considerations when making transportation policy decisions affecting the complex, highly regulated, and heavily taxed motor carrier industry.

> "Complexity is the main issue, and costs will be a huge burden. Do anything we can to make it as simple as possible."
> - Motor Carrier Working Group Participant

"Registered weight is preferred. Easy to verify if fees are calculated using the registered weight."

"Weight needs to be included..."

"Everyone pays the same rate based on weight of vehicle."

- Motor Carrier Working Group Participants

04 2020-2021 State Passenger Vehicle Pilot

4.1 Overview

The Coalition's 2020-2021 State Passenger Vehicle Pilot took place in Delaware, New Jersey, North Carolina, and Pennsylvania, from August 2020 to January 2021. As shown in Figure 4-1, 383 vehicles accrued over 1.4 million miles traveling among 27 states (10% of mileage was accrued out of state).

Participant recruitment was tailored to meet each state's specific objectives. Recruitments efforts in Pennsylvania focused on rural drivers, while Delaware focused on both rural and privacy advocates. New Jersey and North Carolina recruitment focused on key transportation stakeholders in order to start the conversation about MBUF and learn more about stakeholder opinions on the alternative funding mechanism. Conducting the pilot in four states under a single STSFA grant allowed the states to meet these state-specific goals, while also benefiting from knowledge sharing about lessons learned in the other states and cost savings across the multi-state project.

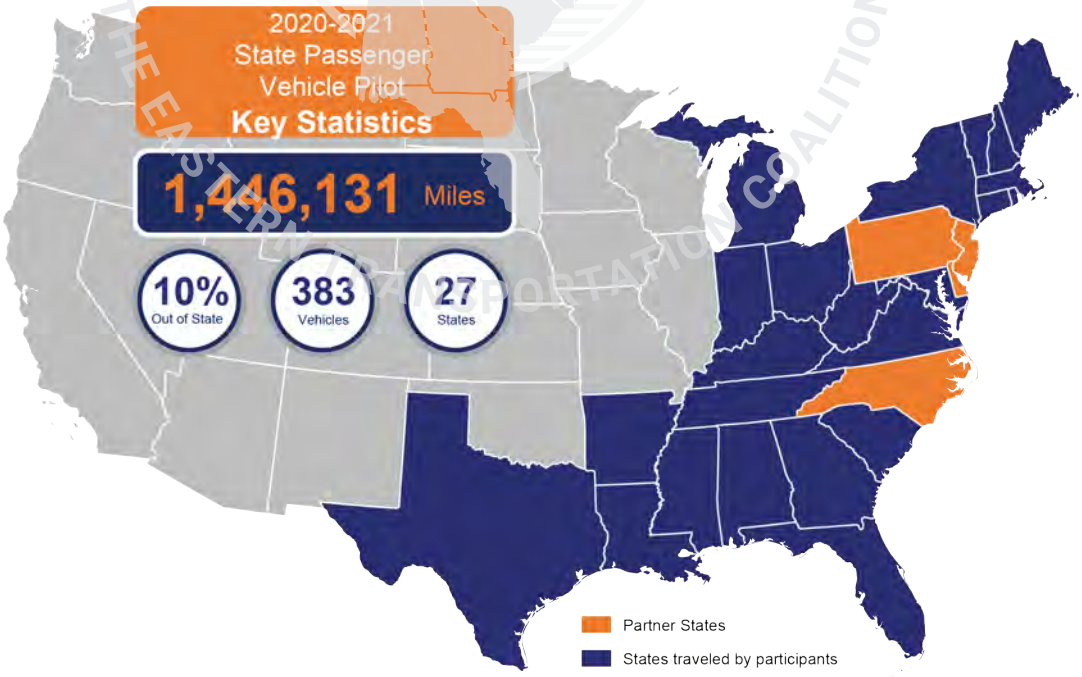


Figure 4-1: 2020-2021 State Passenger Vehicle Pilot Key Statistics

The Coalition worked with the DOTs in each of the four states to recruit participants, including elected officials, state government employees, and business advocacy groups. Recruitment efforts involved email communication and personal outreach, with efforts customized according to each state's goals. A break-down of targeted participants in each partner state is listed in Figure 4-2.

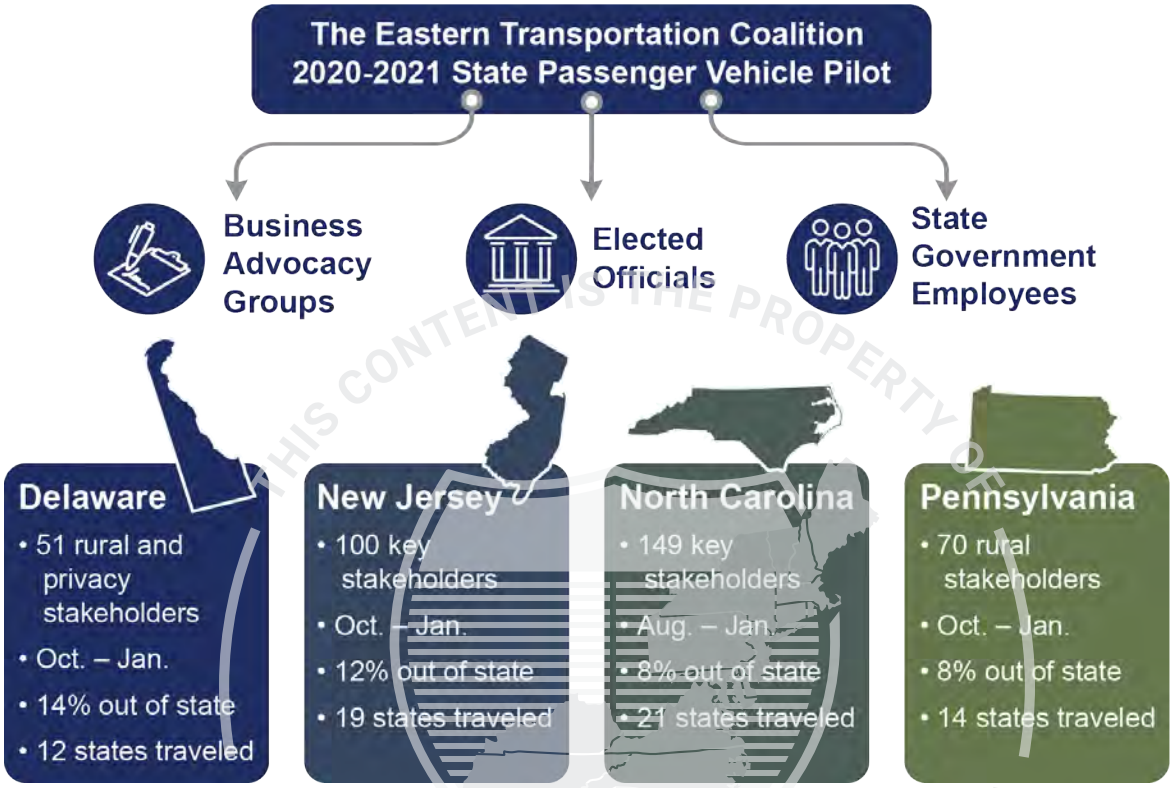


Figure 4-2: 2020-2021 State Passenger Vehicle Pilot Targeted Participants by State

This work also included soliciting feedback from pilot participants through online surveys and focus groups, which are discussed in more detail in Section 4.5.

4.2 Mileage Reporting Options

MBUF work around the country has consistently highlighted the importance of offering choices to participants for reporting mileage. Therefore, the 2020-2021 State Passenger Vehicle Pilot provided participants with two mileage reporting options, both of which utilized a plug-in device that inserts into the vehicle's on-board diagnostic (OBD-II) port: plug-in device with GPS and plug-in device without GPS. Azuga, a third-party vendor, was selected to provide the mileage reporting technology and account management support for this Pilot. Figure 4-3 shows an Azuga plug-in device installed in a pilot participant's vehicle.

Figure 4-3: Azuga Plug-In Device Installed in OBD-II Port

Table 4-1 shows a state-by-state breakdown of activities for the passenger pilot. The vast majority of participants (80%) chose the plug-in device with GPS. This option used GPS technology to differentiate mileage by the state where the miles were accrued. The state-specific per-mile rates were applied to the mileage driven in each state, less a fuel tax credit based on the fuel consumed in each state and the state-specific fuel tax.

Table 4-1: State-by-State Breakdown of Passenger Vehicle Pilot Activities

	# Participants (Active)	% GPS Based Mileage Reporting	% Opt-In to Value-Added Features	Total Miles Driven	% Out-of-State Mileage	#
Delaware	51	88%	38%	169,478	14%	12
New Jersey	100	74%	22%	174,428	12%	19
North Carolina	149	83%	44%	838,038	8%	21
Pennsylvania	70	77%	38%	226,267	8%	14
TOTAL	383	80%	36%	1,446,131	10%	27

The plug-in device with and without GPS used vehicle data to record total mileage and fuel consumption. Without location information to identify the state where the mileage was accrued, the MBUF and fuel tax credit for participants who chose a plug-in device without GPS was calculated based on the vehicle's state of registration using a separate set of per-mile rates and fuel tax values. For additional information on how rates were established, see Appendix B.

Because the plug-in device without GPS does not report location-specific data, this option helps address privacy concerns. However, without GPS, out-of-state mileage, which ranges between 8 to 14% in the pilot states, can only be estimated. This creates a problem managing MBUF across neighboring states.

Both the GPS and non-GPS options allowed users to access value-added features using a phone or computer (see Table 4-2).

Table 4-2: Value-Added Features Provided in 2020-2021 State Passenger Vehicle Pilot

Value-Added Feature	Device with GPS	Device without GPS
MBUF Details: View all the data pertaining to MBUF charges, including your miles traveled and fuel tax credit. Devices with GPS provide this information by state.	X	X
Trip Logs: View details about your trips including trip duration, cost, and carbon footprint.	X	X
Vehicle Health: Get valuable information about your vehicle's health. Now, when the Check Engine light goes on, you'll know why.	X	X
Battery Voltage: Be able to monitor battery performance. You'll know when your dead battery is wearing out and when it's time to replace it.	X	X
Driver Scoring: Receive feedback on how smooth you drive. Driving factors that are scored: high speed, acceleration, braking, and idling.	X	X
Achievements: See how well you drive, sharpen your skills, and earn badges for great driving. Compete with friends and family to see who can unlock the most badges.	X	X
Carbon Footprint: See for yourself how your vehicle is impacting the environment, how it stacks up against other vehicles, and how you can reduce your carbon output.	X	X
Safe Zones: Worry less when a family member—such as your teenager—has the car. Set up geographical zones and receive notifications when your car enters and exits zones.	X	
Enhanced Visual Trip Logs: See where you have been. Trip logs that show individual trips on a map and are shareable with friends.	X	
2MyCar: See where your vehicle is parked, how far away you are, and follow the recommended route to get to it.	X	
Find it Forward: Find places—such as gas stations, restaurants, hospitals, and ATMs—near your current location and in the direction you're already headed.	X	

Providing additional features and driver services as part of an MBUF system has been examined in the Coalition's STSFA activities from the onset of the STSFA work. The premise behind this concept is that such features—and the information provided regarding the trips made, vehicle status, and driving behavior—may help shift the public's willingness to change and accept MBUF. In a departure from previous Coalition pilots, which automatically enrolled participants into value-added features, the 2020-2021 pilot required participants to "opt in" to these features after they plugged in the device and logged on to their account.

As shown in Figure 4-4, a little over a third of the participants chose to opt in, with approximately another third indicating they were unaware of the features and the need to opt in. This suggests that more can be done during the enrollment process to communicate both the availability of such features and how to access them.

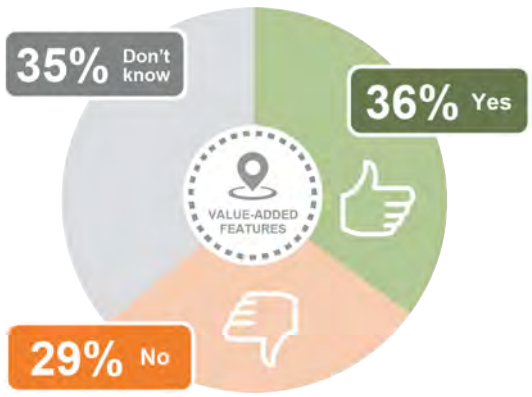


Figure 4-4: 2020-2021 State Passenger Vehicle Pilot Overall Opt-In Rate for Value-Added Features

"I'm more interested in the technology to see what it could provide. I find that stuff fascinating. It's nice to see where my cars are and for the information it provides." - North Carolina Participant

"I picked the GPS and thought that it would be better data so they could see info about the trips, not just number of miles, but origins, destinations. I thought also…would there be considerations for different types of roads? If you're going to be on a high-speed road, is that going to be a higher rate versus taking the backroads, a slower route? Is there an opportunity cost, like, 'It's going to take me longer, but it will be cheaper?'" - New Jersey Participant

In post-pilot surveys, most 2020-2021 State Passenger Vehicle Pilot participants who chose the plug-in device with GPS indicated they did so because they wanted a better sense of where they drive or they desired access to value-added features (see Figure 4-5).

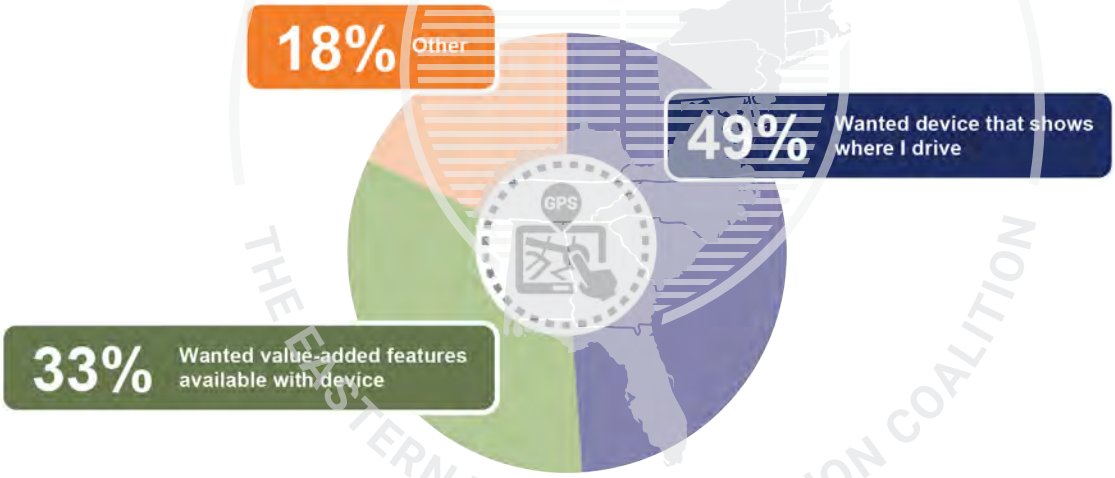


Figure 4-5: 2020-2021 State Passenger Vechicle Pilot Participant Reasons for Choosing Plug-In Device with GPS

In post-pilot surveys, 2020-2021 State Passenger Vehicle Pilot participants who chose the plug-in device without GPS indicated they did not want or need the additional value-added features with GPS (78%); the remainder expressed they did not want a device that shows where they drive (22%).

No matter the device they chose, participants expressed satisfaction with their choice. Eighty-nine percent of plug-in device with GPS users and 94% of plug-in device without GPS users reported satisfaction with the mileage reporting option they chose.

Eighty-nine percent of plug-in device with GPS users and ninety-four percent of plug-in device without GPS users reported satisfaction with the mileage reporting option they chose.

4.3 Rate-Setting and Participant Statements

Like other pilots around the country, the 2020-2021 State Passenger Vehicle Pilot used per-mile rates for calculating MBUF that are based on the concept of *revenue neutral.* In other words, a vehicle operating at the national average of 23 MPG would pay an MBUF that is equal to the amount paid for the state fuel taxes.[1] The per-mile rate calculation is:

Per-Mile Rate = State Fuel Tax / National Fuel Economy Average of 23 MPG

For all mileage driven and recorded during the 2020-2021 State Passenger Vehicle Pilot, participants were charged MBUF minus credit for the estimated fuel tax. For the participants using plug-in device with GPS, the gathered data was used to link the correct MBUF rate to the state in which miles were accrued. For the non-GPS devices users, one MBUF rate was used for accrued miles based on the higher of (a) home state rate or (b) calculated rate based on assumed percentages of out-of-state mileage. Details on how the rates were developed as well as all the MBUF rates used in the 2020-2021 State Passenger Vehicle Pilot are provided in Appendix B.

Every month, pilot participants received a statement that included a summary of driving data for the month, including estimated fuel costs, a comparison between estimated state and federal fuel taxes paid, and estimated MBUF amount. In the 2020-2021 State Passenger Vehicle Pilot, the statement was expanded to include additional information and clarity based on feedback received from participants in previous pilots (see Appendix A for an example). The major changes included:

- Addition of a "Daily Activity Log" page summarizing daily trip-level information including mileage data, fuel taxes, and MBUF by trip
- Addition of a "Trends" page with a chart summarizing a participants monthly miles driven and fuel consumption compared to the average pilot participant (see Figure 4-6)
- Addition of an "Understanding Your Statement" page, which includes information about transportation funding, definitions of terms used in the statement, MBUF and fuel tax rates, and an explanation on how MBUF and fuel tax credits are calculated

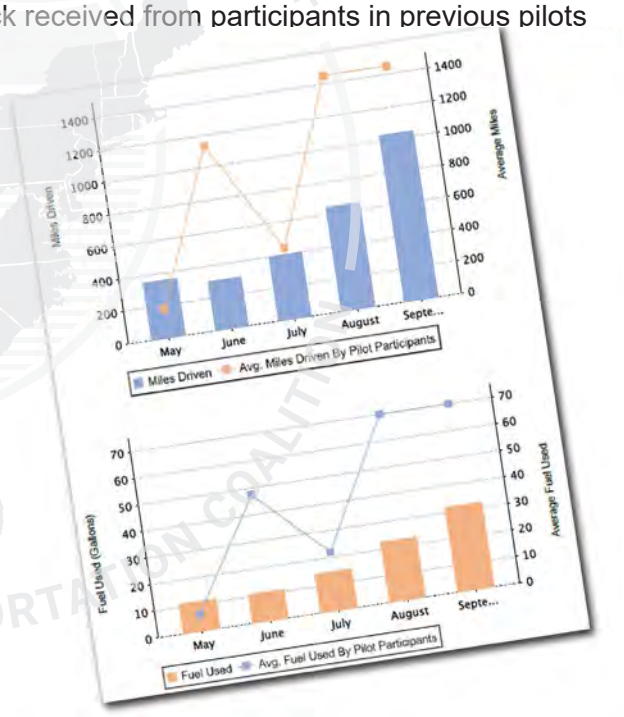


Figure 4-6: Example Monthly Pilot Statement Trends Page

1 The national average of 23 MPG was used for all states except North Carolina who provided state-specific data. The value used for North Carolina is 22.7.

4.4 Tiered Rate Analysis

In statewide public opinion surveys (discussed in Section 5), respondents were inclined to support MBUF because it allows electric vehicle (EV) and plug-in-hybrid vehicle (PHEV) owners to help pay for roadways. At the same time, respondents opposed MBUF because they feared the model would unfairly penalize those who purchase fuel-efficient vehicles that positively impact the environment. These opinions, though slightly contradictory, indicate dual concerns: a desire to incentivize environmentally friendly purchases and a desire for each driver to pay for roadways they use.

A single rate can be limiting when promoting certain practices among passenger vehicle drivers—like the purchase of fuel-efficient vehicles—or reducing the impact on vulnerable members of the driving public.

To better understand how rate setting might affect drivers of vehicles with varying fuel efficiency, the Coalition conducted a background analysis of tiered revenue neutral rates utilizing four categories based on fuel efficiency as shown in Figure 4-7.

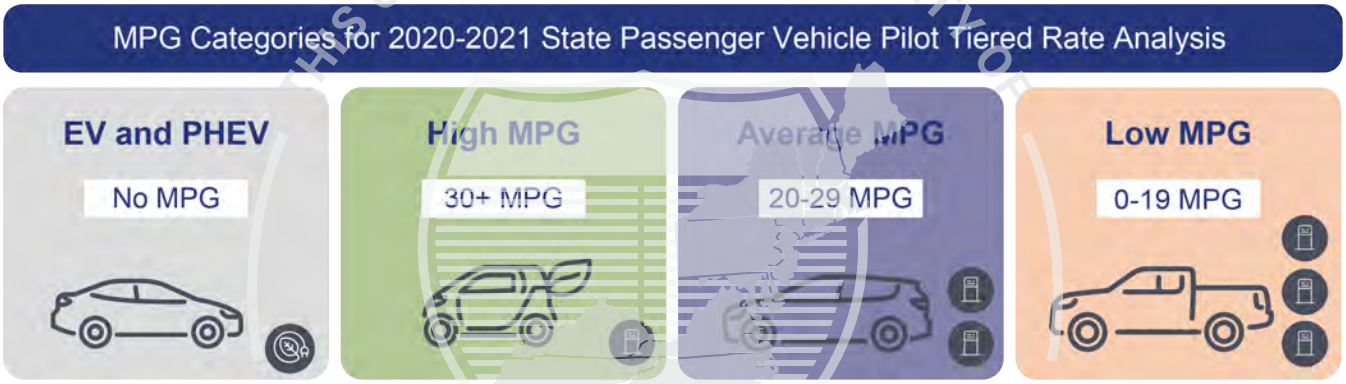


Figure 4-7: MPG Categories for 2020-2021 State Passenger Vehicle Pilot Tiered Rate Analysis

Under this rate structure, the most fuel-efficient vehicles would pay a lower MBUF rate and the least fuel-efficient vehicles would pay a higher rate. The rates for each vehicle category, as well as a comparison of the tiered rate and the single-rate approach, are shown in Table 4-3. The rates were structured such that no vehicle would receive a net MBUF credit (i.e., the MBUF paid would not be greater than the fuel tax paid). Tiered rates results were not provided to passenger vehicle pilot participants, but used to inform future rate setting approaches. Results from 2020-2021 State Passenger Vehicle Pilot Tiered Rate Analysis are summarized in Section 9.4.

Table 4-3: Tiered Rates for 2020-2021 State Passenger Vehicle Pilot

Vehicle Category	MPG Range	MBUF Rates (cents / mile)				Single Rate Approach (cents / mile)			
		DE	NJ	NC	PA	DE	NJ	NC	PA
EV and PHEV	N/A	0.40	1.00	1.00	1.00	1.00	2.20	1.60	2.55
High MPG	30+	0.70	1.60	1.30	1.78				
Average MPG	20-29	1.00	2.20	1.60	2.55				
Low MPG	0-19	1.44	3.17	2.27	3.67				

4.5 Participant Feedback

To gather feedback about the pilot experience, pilot participants in each state were invited to complete two online surveys:

1. Pre-Pilot Survey: Administered shortly after enrolling in the pilot and focused on capturing participants' attitudes about the enrollment and onboarding process, their current driving and fueling habits, and their baseline attitudes about MBUF and knowledge of transportation funding. This initial survey had a response rate of approximately 36%.
2. Post-Pilot Survey: Administered shortly after the end of the pilot and gauged pilot participant satisfaction with mileage reporting devices, optional value-added features, simulated monthly billing statements, data accuracy, and the security of personal information. It also provided a final update on overall perceptions about MBUF fairness and implementation. The final pilot survey had a response rate of approximately 39%.

Having the opportunity to share opinions with policymakers was the primary motivation participants had for joining the pilot (76%). Secondary motivations for participation included learning how much they pay in fuel taxes and understanding how road construction, maintenance, and operations are funded (57%).

Most participants (88%) reported satisfaction with the overall pilot, specifically the mileage reporting option they selected and all aspects of the monthly statements. Most pilot participants found that the monthly statements clearly communicated the amount to be billed (90%), communicated the difference between what they would pay with an MBUF as opposed to a fuel tax (89%), provided helpful information on how MBUF and fuel tax credits are calculated (85%), and provided helpful information on total transportation costs (85%).

While surveys provide an excellent way to measure what participants think about specific issues or experiences, they tell us less about how and why people think about such issues and experiences. In order to gain a deeper understanding of perceptions, attitudes, and experiences, the Coalition conducted online focus groups for pilot participants in Delaware, New Jersey, North Carolina, and Pennsylvania.

Focus group participants were recruited from pilot participants with efforts made to ensure diversity by gender, age, political orientation, and ethnicity. Additional efforts were made to recruit a mix of participants from urban, suburban, and rural areas; drivers of older and newer vehicles; drivers of gas/diesel, hybrid, PHEVs, and EVs; and participants who accrue low, moderate, and high mileage on a daily basis. The focus groups were conducted from March 16 to 20, 2021, and included 29 pilot participants across the four states. A professional moderator led each focus group, which consisted of both written exercises and group discussions. Although research of this type is not designed to measure with statistical reliability the attitudes of a particular group, it is valuable for giving a sense of the attitudes and opinions of the population from which the sample was drawn.

4.5.1 Reporting Accuracy

Prior to participating in the 2020-2021 State Passenger Vehicle Pilot, one in four pilot participants were concerned with their device's ability to accurately capture total mileage. Additionally, participants expressed concern about their device's ability to correctly calculate fuel tax and out-of-state mileage. These concerns dropped significantly after participation in the pilot, as shown in Figure 4-8.

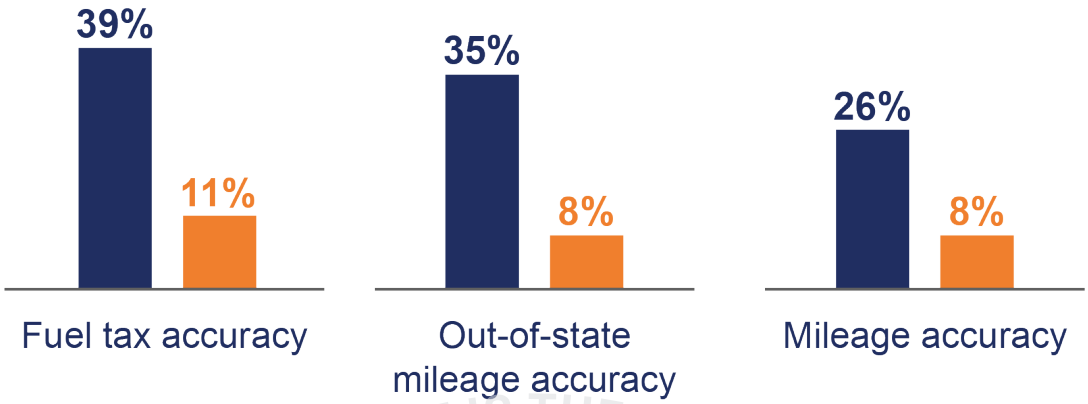


Figure 4-8: 2020-2021 State Passenger Vehicle Pilot Concerns with Accuracy Before and After the MBUF Pilot

Analysis during the 2020-2021 State Passenger Vehicle Pilot showed that MBUF technology provided accurate data to the account manager, Azuga. System acceptance testing before the start of the pilot, as well as similar testing conducted prior to previous Coalition pilots, demonstrated and confirmed the accuracy of the OBD-II data. The accuracy of mileage (as compared to odometer readings) was +/- 2% for internal combustion engine vehicles,[2] with hybrids demonstrating slightly greater variations. Accuracy of fuel used was +/- 3%.

Drivers noticed this accuracy, reporting approval of MBUF technology's ability to accurately report mileage. In post-pilot surveys, the vast majority of 2020-2021 State Passenger Vehicle Pilot participants—regardless of their device option—said their device accurately reported mileage (see Figure 4-9).

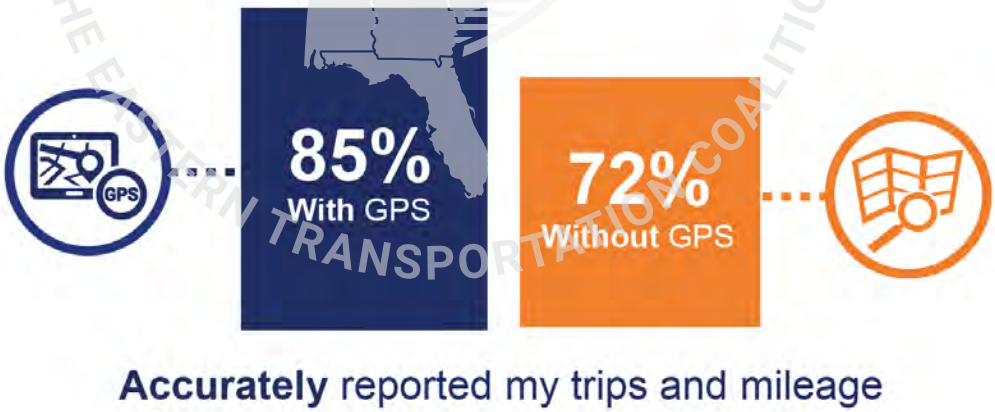


Figure 4-9: 2020-2021 State Passenger Vehicle Pilot Participant Views of Device Accuracy

2 Odometer variance to actual miles is typically +/- 5%. Additionally, odometer data is based on wheel speed, which is dependent on wheel radius. A change in wheel radius of 5 mm (e.g., inflation pressure) can result in a change in the mileage reading of 2%.

"It worked great. I received a breakdown of the mileage I traveled in each state I traveled." - North Carolina Participant

"[The monthly statement] let me check the statements against where I was and was very accurate." - Delaware Participant

"It was something that I could easily digest…I was happy with the statements." -Pennsylvania Participant

4.6 Fuel Location Study

Another feature tested during the 2020-2021 State Passenger Vehicle Pilot was the ability of MBUF technology to identify fuel purchase location and amount. Most MBUF pilots operate and calculate the fuel tax credit under the assumption that fuel consumed in each state is also purchased—and the fuel tax paid—in that same state. However, because of the ease of cross-state travel in Eastern states, motorists can easily drive through multiple states between fill-ups.

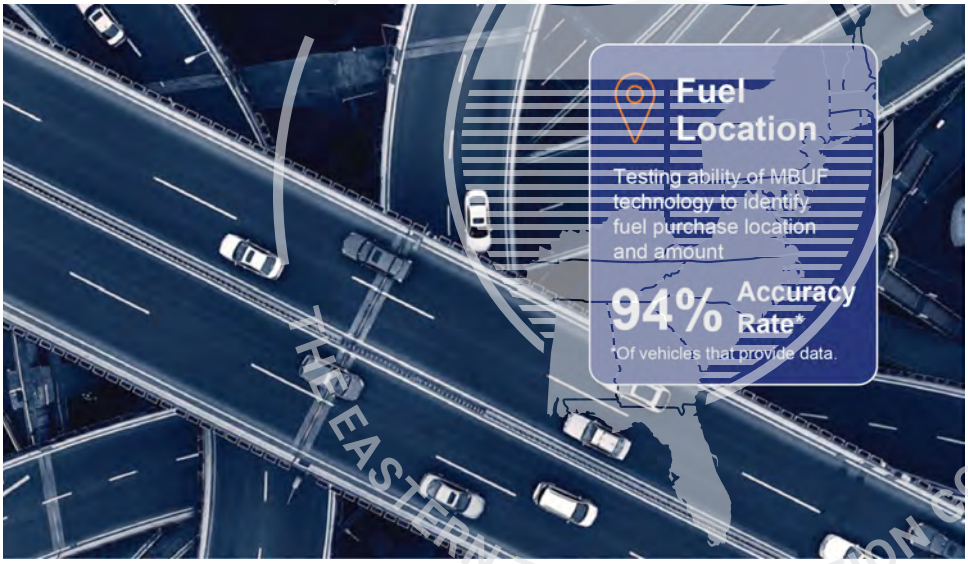


Figure 4-10: Fuel Location Study Results

Additionally, given the wide range of fuel costs and fuel tax rates in Eastern states, some residents opt to drive to neighboring states to purchase fuel at a less expensive rate.

To explore how this practice might affect revenue under an MBUF model, the Coalition conducted a small test with 10 volunteers and found that MBUF GPS-enabled technology that reported data could identify the state in which the fuel was purchased (100% accuracy) and how much fuel was purchased (94% accuracy) (see Figure 4-10). However, there were some vehicles in the test (approximately 10%) that never provided the necessary data via the OBD-II port. This is because some vehicles mask this data from the OBD-II or code fuel events differently from the standard.

Although this small test demonstrated that MBUF GPS technology could accurately determine fuel purchase location, pilot participant behavior suggests such data may not be widely needed. In post-pilot surveys, 91% of pilot participants stated they rarely cross state lines to purchase fuel. Because of the expense of implementing an MBUF that captures cross-state fuel purchases (and the need for GPS-enabled devices), implementing such a program for the small portion of the populace who purchases fuel outside of their resident state would not be cost effective. Furthermore, MBUF is intended as a long-term replacement for the fuel tax, making distribution of fuel tax credits eventually unnecessary.

05 Public Opinion Surveys

5.1 Overview

Conducting statewide public opinion surveys is the first step in identifying the general public's thoughts about MBUF, understanding of transportation funding, and reasons to support or oppose funding approaches like MBUF. The survey results establish a baseline to monitor and evaluate changes in attitudes over time, as well as to compare findings across multiple states. These insights can in turn help lay the groundwork for public education efforts, communication campaigns, and determining how an MBUF system should be designed.

To gauge attitudes about MBUF and transportation funding— including knowledge gaps, priorities, and concerns—in 2020, the Coalition conducted statewide public opinion surveys in Delaware, New Jersey, North Carolina, and Pennsylvania. In 2019, the Coalition conducted a similar survey among the general public in Delaware and Pennsylvania, establishing a baseline against which the 2020 results were compared.

Performed by DHM Research, who provides opinion research and consultation throughout the U.S., these surveys focused on registered voters and were conducted by telephone with a live interviewer and text-to-online survey. In gathering responses, a variety of quality control measures were employed, including questionnaire pre-testing and validation. Respondents included approximately 2,000 residents (about 500 residents from each state), yielding a sufficient sample size to assess opinions generally and to review findings by multiple subgroups, including age, gender, and area of the state. The survey took about 17 minutes to complete and included quotas and weighting by age, gender, area of state, and ethnicity to ensure a representative sample. The margin of error was ±4.4% for each state.

5.2 Survey Results

The statewide public opinion surveys revealed that, even during a global pandemic, transportation is among the top-tier issues that residents want their leaders to address. In each of the states, maintaining existing transportation infrastructure was identified as a top priority by the vast majority of respondents (88% to 93%). Additionally, about two-thirds of residents expressed that investing in public transportation is an important area of focus.

Despite public enthusiasm for certain transportation priorities, conversations around funding may prove challenging. Outside the commercial transportation industry, the general public doesn't realize the transportation system faces an urgent funding problem. Because of this, policymakers may find it challenging to discuss new funding mechanisms without first alerting people to the inability of the fuel tax to keep up with road maintenance, operational needs, and new infrastructure.

For example, the vast majority of respondents (85% to 92%) have positive perceptions of their states, and a significant majority (61% to 79%) have positive views of their state's highway quality (see Figure 5-1).

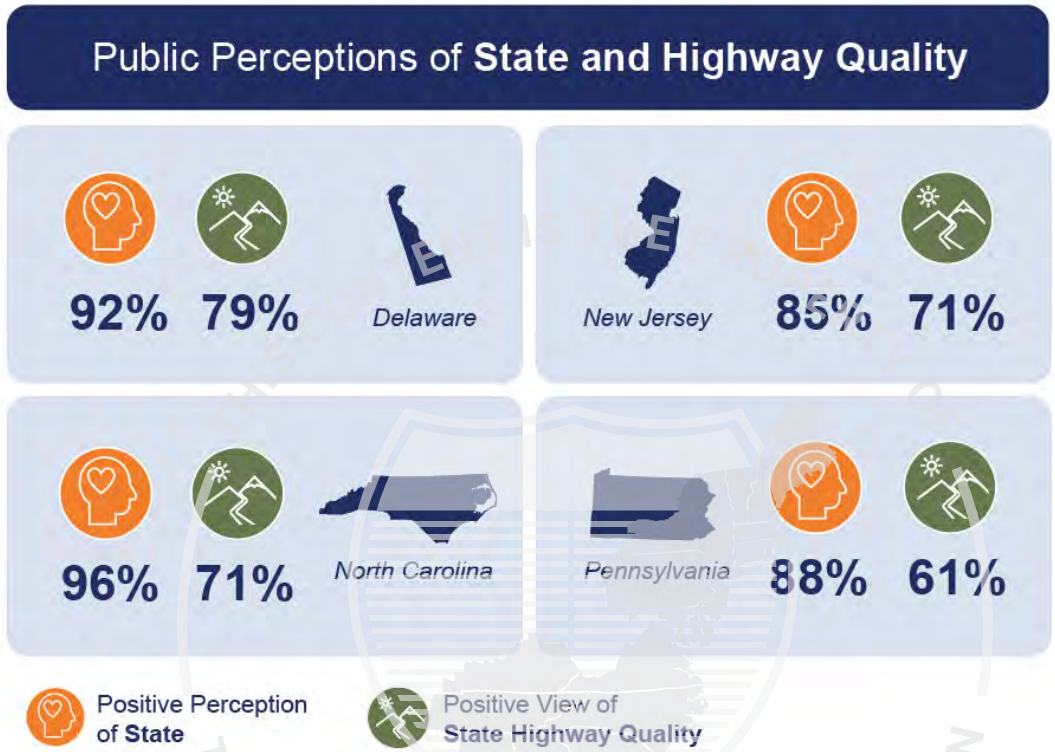


Figure 5-1: Public Perceptions of State and Highway Quality

Additionally, Table 5-1 shows about two-thirds of residents in each state believe that transportation funding is staying the same or increasing. Taken together, these findings point to a gap between transportation policy leaders and the public regarding the quality and sustainability of the funding transportation system.

Table 5-1: Public Perceptions of Transportation Funding

Perceptions of Transportation Funding	Delaware	New Jersey	North Carolina	Pennsylvania
Increasing	38%	44%	36%	40%
Staying the Same	38%	26%	33%	28%
Decreasing	15%	20%	20%	19%

Importantly, the surveys indicated unfamiliarity with MBUF as a concept. In each of the states, the vast majority of those surveyed (67% to 73%) were unfamiliar with MBUF. However, after hearing a brief explanation of the concept, about half of respondents in each state think that an MBUF would be as fair or fairer than the fuel tax (see Table 5-2).

Table 5-2: Public Perceptions of MBUF Fairness Compared to the Fuel Tax

Statewide Public Opinion Survey Question	Delaware	New Jersey	North Carolina	Pennsylvania
Percentage of Statewide Public Opinion Survey Respondents Who Think MBUF Is as Fair or Fairer than Fuel Tax	45%	47%	53%	49%

The biggest concerns about an MBUF system include (see Figure 5-2):

- **MBUF might unfairly impact rural residents.** Respondents expressed concern that an MBUF system might unfairly impact rural residents (65% to 73%).
- **MBUF might be a hassle to report and pay for miles driven.** A majority of respondents (62% to 71%) believed that reporting and paying for MBUF would be burdensome.
- **MBUF would unfairly benefit out-of-state drivers.** Most respondents(51% to 68%) believed MBUF would unfairly benefit out-of-state drivers.
- **MBUF would unfairly impact drivers of fuel-efficient vehicles.** In Delaware (47%), New Jersey (60%), North Carolina (54%), and Pennsylvania (57%), respondents expressed concern that MBUF would be unfair for drivers of fuel-efficient vehicles.

Figure 5-2: Top Reasons to Oppose MBUF, According to Public Opinion Surveys

On the other hand, respondents identified several reasons to support MBUF, including the following (see Figure 5 -3):

- **MBUF can leverage new technology.** Respondents found the fuel tax to be out of date and thought MBUF allows for the leveraging of new technology (49% to 61%).
- **MBUF is more sustainable.** Respondents thought MBUF offers a more sustainable funding mechanism than the fuel tax (55% to 62%).
- **MBUF is fairer to more drivers.** Respondents said MBUF allows each driver to pay their fair share (53 to 62%), is a less regressive tax for older vehicles (52% to 60%), and allows fuel-efficient drivers to contribute to transportation funding more proportionally (52% to 63%).

Figure 5-3: Top Reasons to Support MBUF, According to Public Opinion Surveys

Public opinion survey responses indicate that the concept of "pay for what you use" continues to resonate with the public.

Taken together, these survey responses indicate that the concept of “pay for what you use” continues to resonate with the public.

These findings suggest that the public is open to the concept of an MBUF as a fair transportation funding alternative. Prior work performed by the Coalition also supports this finding. In 2019, the Coalition conducted statewide public opinion surveys in Delaware and Pennsylvania to gauge public opinion; alongside this earlier work, the 2020 survey highlights several key changes in public opinion about MBUF (see Figure 5-4). Between 2019 and 2020, support for MBUF increased in both Delaware (4%) and Pennsylvania (8%). Additionally, the public’s largest concern about privacy and use of personal information decreased (7% in Delaware and 3% in Pennsylvania).

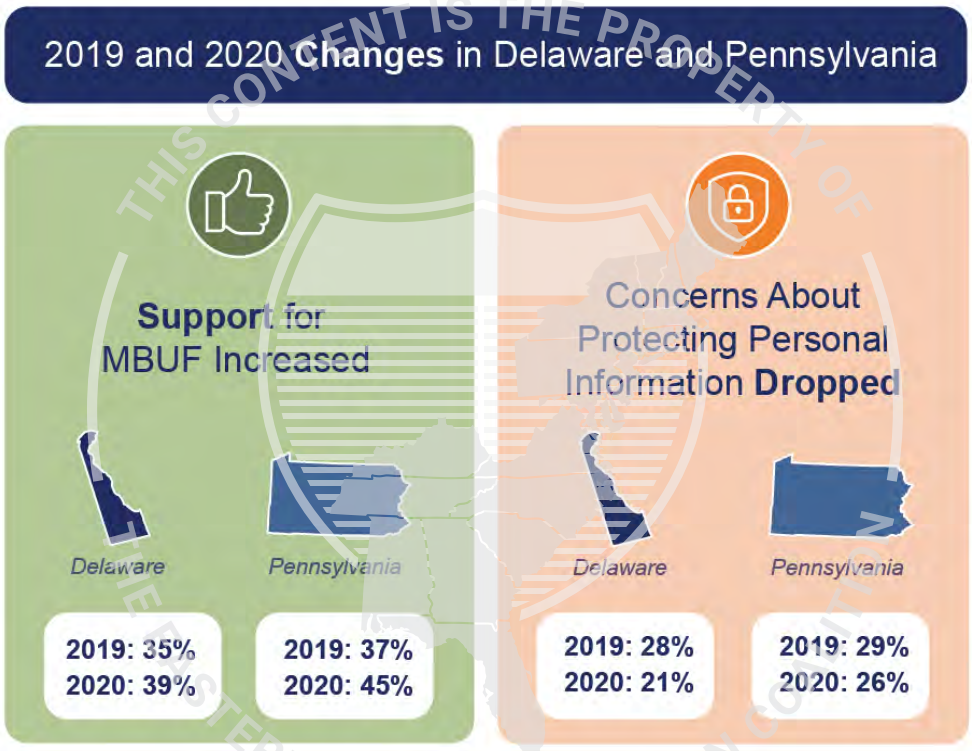


Figure 5-4: Changes in Public Opinion from 2019 and 2020 in Delaware and Pennsylvania

Looking across the Coalition’s public opinion surveys, a few key takeaways become clear:

Lead with values in public communications about transportation and transportation funding.

Transportation stakeholders and policymakers possess a high level of awareness about the challenges facing the state’s transportation infrastructure, especially the ability to fund it adequately. Communications about funding can become highly technical very quickly. However, the public is more interested in the values that a well-functioning transportation system helps support: quality of life, safety, and a healthy economy. Leading with values and emphasizing the tangible benefits of well-maintained roads and bridges is likely to make the public more receptive to proposals about transportation funding alternatives.

When exploring MBUF as a potential alternative to the fuel tax, highlight the challenges that the alternative is meant to address.

Support for implementation of a MBUF program among transportation stakeholders can in part be explained by their high awareness of transportation infrastructure and funding challenges. The general public, however, is less aware of these challenges. Statewide public opinion survey results show that a majority of residents believe that roads are in good condition and that funding is either increasing or staying the same. Many are unaware that the fuel tax is a primary source of transportation funding. Even fewer are aware of the key funding challenge facing transportation policymakers: that transportation revenue is dependent upon fuel taxes and that such taxes are declining as fuel efficiency standards are increasing. Educating the public about these challenges will be essential to build support for alternative and more sustainable funding approaches such as MBUF.

Emphasize the guiding principle of "pay for what you use" in communications about MBUF.

The concept of fairness resonates with both the public and with transportation stakeholders and policymakers as well. Central to this conception of fairness—when it comes to MBUF— is the idea of paying for what you use or paying for how much you use the roads. When conversations about fairness pit groups against each other (drivers of fuel-efficient vs. less fuel-efficient vehicles, rural vs. urban residents, those who drive more vs. those who drive less), they are less effective. They are also often based on mistaken or exaggerated assumptions about who stands to benefit. Bring the conversation back to the most important principle: it is fair that everyone pays for the roads they use.

If implementing an MBUF program, consider keeping it simple—at least at first—to build broad public support.

MBUF technology can be leveraged to address a variety of transportation-related policy initiatives, from tiered rates for drivers of less-polluting vehicles or for low-income drivers, to congestion mitigation, to integration with tolling. At the same time, focus group participants urged caution when it came to utilizing an MBUF system for multiple policy purposes. Keeping MBUF simple—a flat mileage fee as an alternative to the current fuel tax—at least in its early phases, might be the best way to introduce the concept and to build broad public support. Over time, the technology can be flexibly applied to tackle specific needs, policies and to address equity-based concerns as well.

06 Geographic Equity Analysis

Any changes to transportation funding should be examined from an equity lens, including how such changes may affect drivers in different geographies with varied driving patterns. A key concern raised during the Coalition's 2019 Passenger Vehicle work was that MBUF would be unfair to rural residents, given they drive longer distances for everyday activities. To better understand how a transition from a consumption-based system to a distance-based system might affect passenger vehicle drivers in various communities, the Coalition tasked EBP, an economic and research firm, with conducting a Geographic Equity Analysis in Delaware, New Jersey, North Carolina, and Pennsylvania.

The Geographic Equity Analysis examined the implications on different geographies of switching from the fuel tax to a distance-based approach. Because many states are exploring a revenue neutral approach to MBUF—wherein a vehicle operating at the national or state average fuel economy would pay an MBUF that is equal to the amount paid for the state fuel taxes —EBP conducted the analysis using a revenue neutral per-mile rate.

The analysis had three key steps: 1) classification of households into five geographic reporting classes, 2) estimation of travel behavior, and 3) analysis of vehicle fleet characteristics (see Figure 6-1). Critically, this study utilizes actual vehicle registration data from the member state partners to allocate specific vehicle characteristics to geographic areas, making its effect estimates highly accurate.

Analysis assumes a revenue-neutral rate, consistent with pilots and programs around the country.

Figure 6-1: Three Components to Determining Household Impact

6.1 Geographic Classes

The foundation of the analysis was a classification system that recognizes both density (urban/rural) and travel patterns (primarily commuting-based travel) between and within various types of geographic areas. Instead of using a single urban and a single rural group, the analysis utilized five geographic classes to capture differences in travel behavior between core and suburban portions of large cities, between large and small urban areas, and between less dense areas with and without close ties to urban areas.

The unit for the geographic classification is the U.S. Census Bureau tract, allowing the identification of rural portions of metropolitan areas. This also created a more accurate analysis of the economic impacts of adopting an MBUF system, since census tracts are the smallest practical statistical social analysis unit available for reliable examination of these issues. The resulting five geographics used were large metropolitan (LM) urban, LM suburban, small urban, mixed, and rural areas (see Figure 6-2).

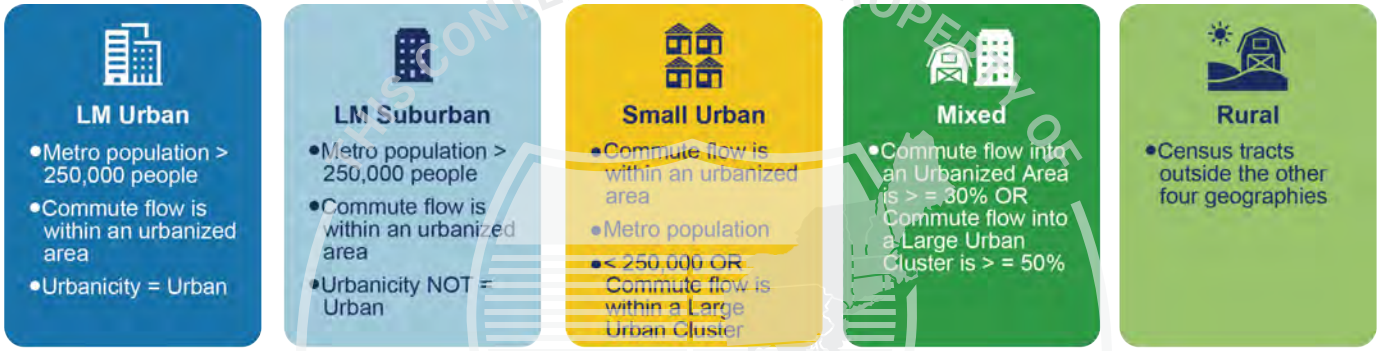


Figure 6-2: Characteristics Used for Geographic Classification

Data products used to classify census tracts into one of the five geographics included Longitudinal Household Dynamics (LEHD), Longitudinal Origin-Destination Employment Statistics, and the American Community Survey. Figure 6-3 shows how census tracts in each participating state were broken down by the geographic classification.

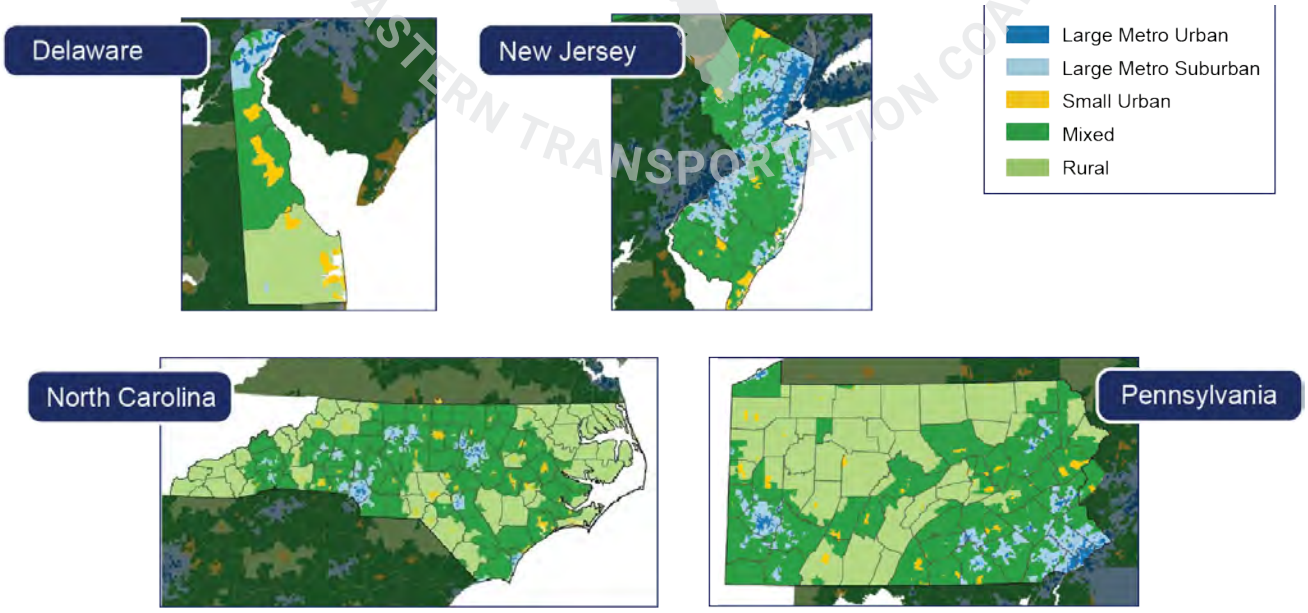


Figure 6-3: Geographic Breakdown in the Four 2020-2021 State Passenger Vehicle Pilot States

6.2 Travel Behavior

The next step in the Geographic Equity Analysis generated travel behavior estimates from the U.S. Bureau of Transportation Statistics Local Area Transportation Characteristics for Households (LATCH) dataset. Table 6-2 shows the average vehicle miles traveled (VMT) and vehicle trips across the four states by the five geographics.

Table 6-2: Average Daily Travel Behavior Estimates by Geographics

Geographic Classification	Percent of Households	Average VMT	Standard Deviation	Average Vehicle Trips	Standard Deviation
LM Urban	31.7%	27.2	7.7	3.8	1.1
LM Suburban	29.3%	44.9	6.1	5.2	0.7
Small Urban	6.4%	34.5	8.3	4.5	0.8
Mixed	24.5%	56.1	6.3	5.2	0.4
Rural	8.0%	52.2	6.8	5.0	0.4
All Urban	67.4%	35.1	11.0	4.4	1.1
Overall	-	41.2	13.5	4.7	1.0

Figure 6-4 shows the distribution of daily VMT across households in each geographic location. The travel characteristics profiles for different geographic classifications are largely consistent across the four states studied. The data shows that mixed geographic areas, which are low density, have significant commuting flows to urban areas, and have the highest estimated daily VMT. Conversely, the LM urban skews towards shorter trips and has the lowest daily average VMT. Trips and VMT vary more between households in small urban areas than any other category, but the overall distribution is wider for LM urban areas. These results are likely due to the prevalence of alternative modes of travel in urban areas, such as public transportation. In mixed and rural geographics, the narrow distributions and lack of variation indicate that households often have limited modal choices and need to drive longer distances to reach jobs and other destinations.

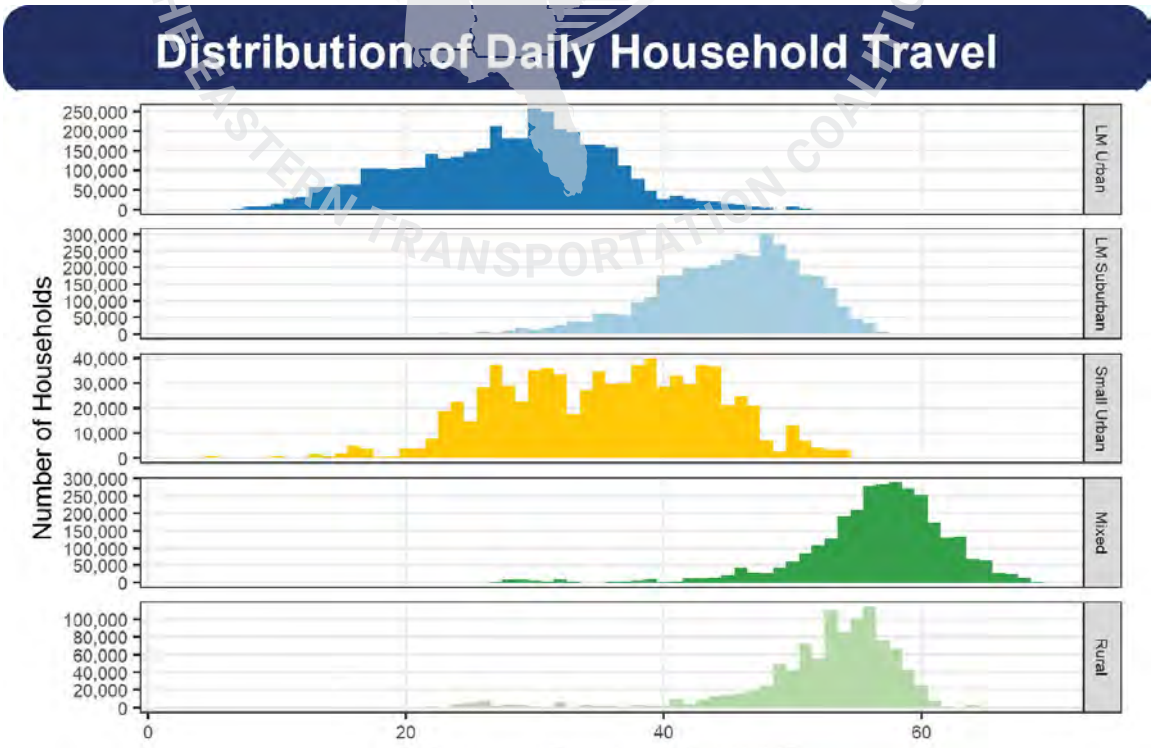


Figure 6-4: Estimated Daily Household VMT

The reason for MBUF's reduced economic impact has less to do with how much people drive, and more to do with the fuel efficiency of the vehicle they drive.

6.3 Vehicle Fleet Analysis

The final step in the Geographic Equity Analysis was the tabulation of vehicle fleet characteristics for each state by each of the five geographics. To carry out this step, each state provided anonymized vehicle data for all vehicles registered in the state. A total of 20,728,070 records were analyzed in this step. The National Highway Transportation Safety Administration Produce Information Catalogue and Vehicle Listing (vPIC) decoder and the U.S. Environmental Protection Agency fuel economy information were used to identify the make, model, year, and fuel economy information for each vehicle identification number. The result was a set of tables for each state listed by the five geographics: average vehicle per household, number of vehicles per fuel type (gas, diesel, hybrid, electric), average fuel efficiency, and average vehicle age. The findings across each state are presented in Table 6-3 and Table 6-4 .

Table 6-3: Average Fuel Economy by Geography by State (MPG)

Geography	Delaware	New Jersey	North Carolina	Pennsylvania
LM Urban	21.4	21.5	22.7	21.6
LM Suburban	21.3	21.4	21.9	21.4
Small Urban	20.7	20.5	21.1	20.8
Mixed	20.5	20.5	20.6	20.3
Rural	20.0	N/A*	20.1	19.6
All Urban	21.1	21.4	21.2	21.5
Overall	20.8	21.3	21.1	20.9
*There are no Census tracts classified as rural in New Jersey.				

Table 6-4: Average Vehicle Age by Geography by State

Geography	Delaware	New Jersey	North Carolina	Pennsylvania
LM Urban	10.1	9.3	9.3	9.9
LM Suburban	9.4	8.6	9.7	8.2
Small Urban	9.7	9.6	10.9	10.4
Mixed	9.8	9.0	11.4	10.1
Rural	10.6	N/A*	12.2	10.5
All Urban	9.7	9.0	9.7	9.5
Overall	9.9	9.0	10.8	9.7
*There are no Census tracts classified as rural in New Jersey.				

6.4 Household Impact Results

Taking into account geographics, travel behavior, and vehicle fleet, a financial impact analysis was conducted to compare the equity effects for households of replacing fuel taxes with MBUF. The studied MBUF rate was calculated to be revenue neutral, and thus results in zero statewide revenue impact and consistent with the current MBUF pilot and state program approaches. The travel behavior estimates and vehicle data were used to estimate annual household fuel tax payments in each tract. The project team then calculated the revenue neutral MBUF by dividing the total fuel tax revenues by the total estimated statewide VMT.

This multi-step Geographic Equity Analysis showed that rural and mixed geographic drivers may pay less with MBUF than they do with current fuel tax structures, and that most drivers would be minimally impacted by a shift to MBUF using a single, revenue neutral rate applied to all passenger vehicles. The average **annual** amount paid for fuel by a household would typically increase or decrease by about $18. In other words, depending on where residents live and what type of vehicle they drive, **a shift to MBUF is estimated to change household expenses by about $1.50 a month** (see Figure 6-5).

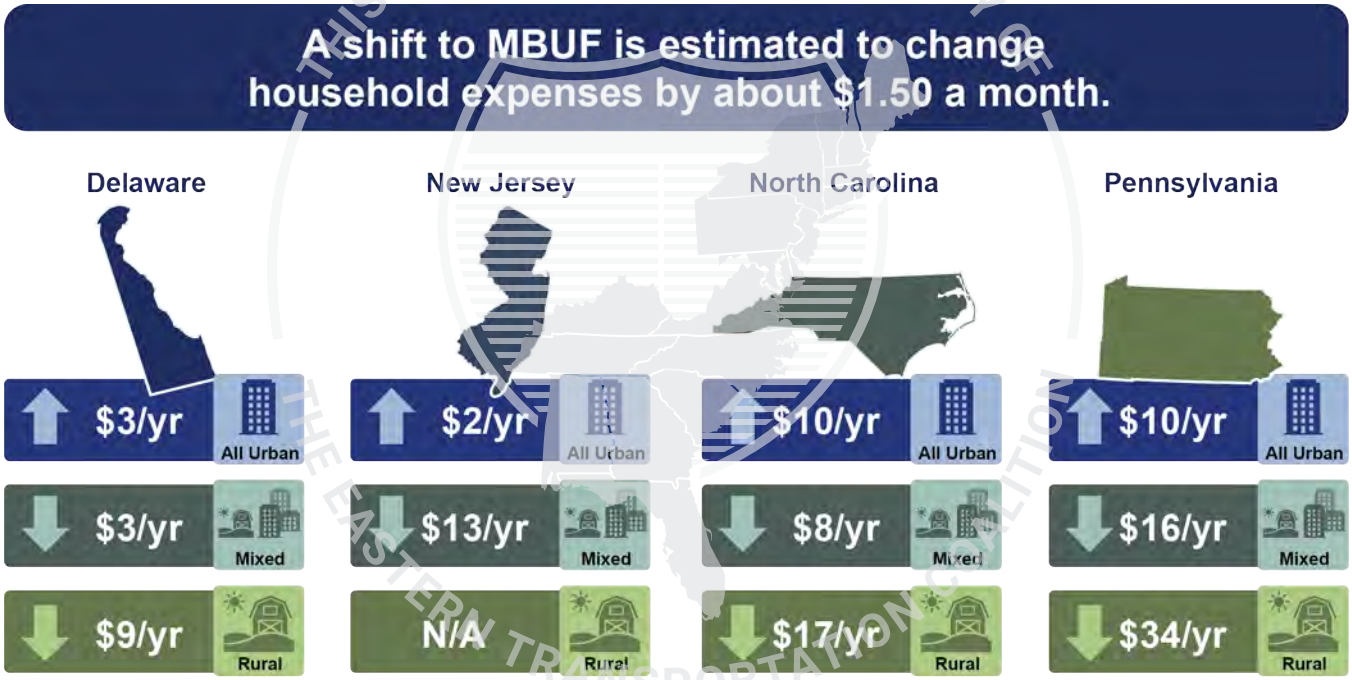
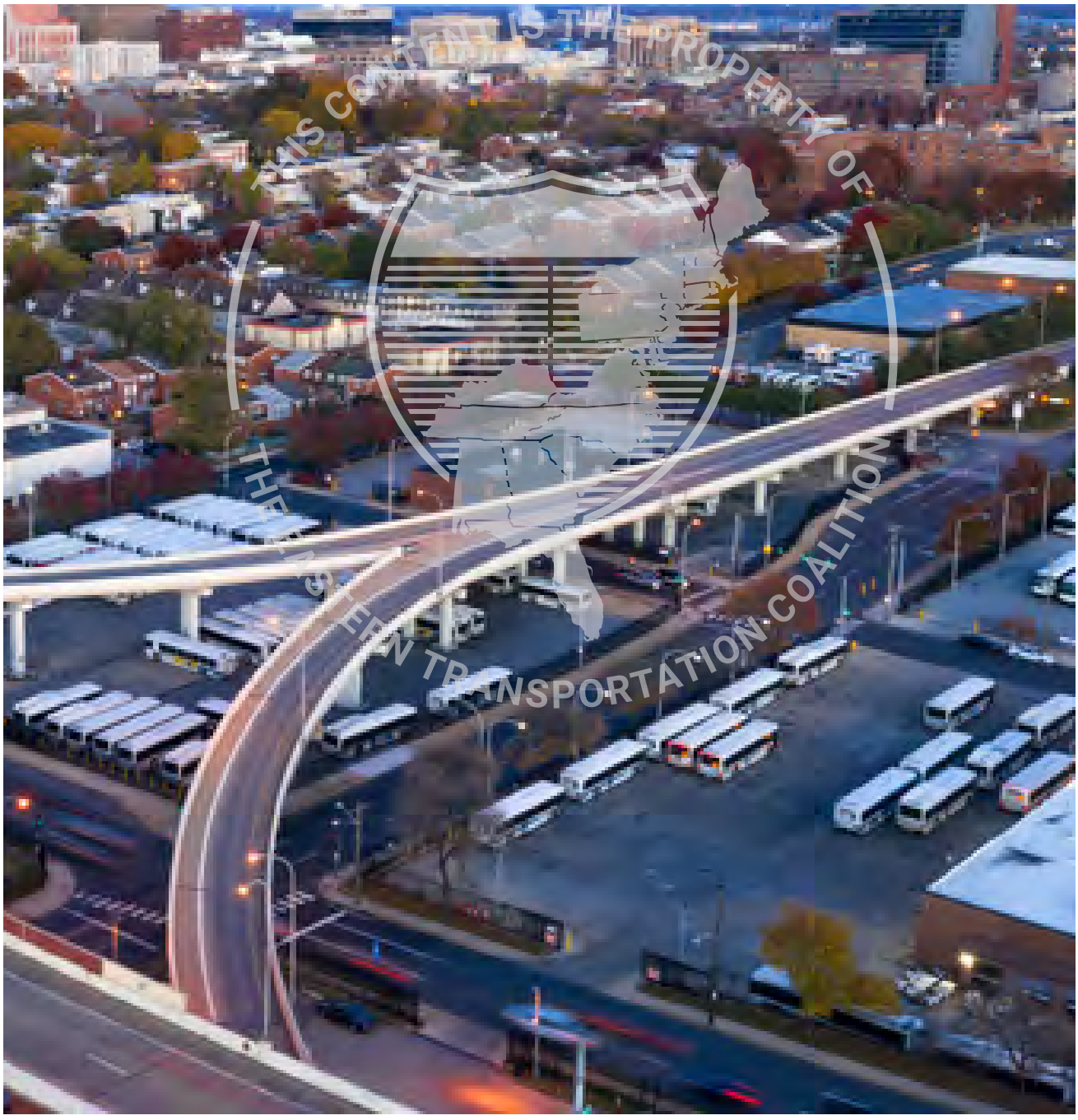


Figure 6-5: Average Annual Household Expenses Changes Under a Shift to MBUF

These results may at first seem implausible given rural and mixed geographics drive more miles (Table 6-2). However, the household savings arrive because drivers in rural and mixed geographic classifications tend to have older, less fuel-efficient vehicles and urban areas tend to have newer, more fuel-efficient vehicles (Table 6-3 and Table 6-4). Under the current fuel tax system, this means that rural households are currently paying more than urban households—even if they drive the same number of miles. In addition, urban areas (LM urban, LM suburban, and small urban) contain nearly 70% of the households in the states studied and nearly 60% of total VMT (Table 6-2). The larger number of households in urban areas means that a larger share of the mileage-based charges is assessed in urban areas. In summary, the reason for MBUF's reduced economic impact has less to do with how much people drive, and more to do with the fuel efficiency of the vehicle they drive.

This multi-step Geographic Equity Analysis showed that rural and mixed geographic drivers may pay less with MBUF than they do with current fuel tax structures, and that most drivers would be minimally impacted by a shift to MBUF using a single, revenue neutral rate applied to all passenger vehicles.



07 Tolling

Assessing the potential of synergies between tolling and MBUF is particularly important in the Eastern U.S., which has approximately 3,300 centerline miles of tolled facilities (see Figure 7-1), including roadways, bridges, high occupancy toll lanes (HOT), and express toll lanes (ETL). Depending on the state, the collected funds are part of the statewide transportation budget and are used primarily for operating, maintaining, and enhancing the tolled facilities. For this reason, and because most Coalition member states utilize tolling as a revenue mechanism, the Coalition has explored potential linkages between tolling and MBUF since the beginning of its STSFA work. Leveraging such opportunities could make payments easier for drivers and potentially reduce administrative and compliance costs associated with an MBUF system.

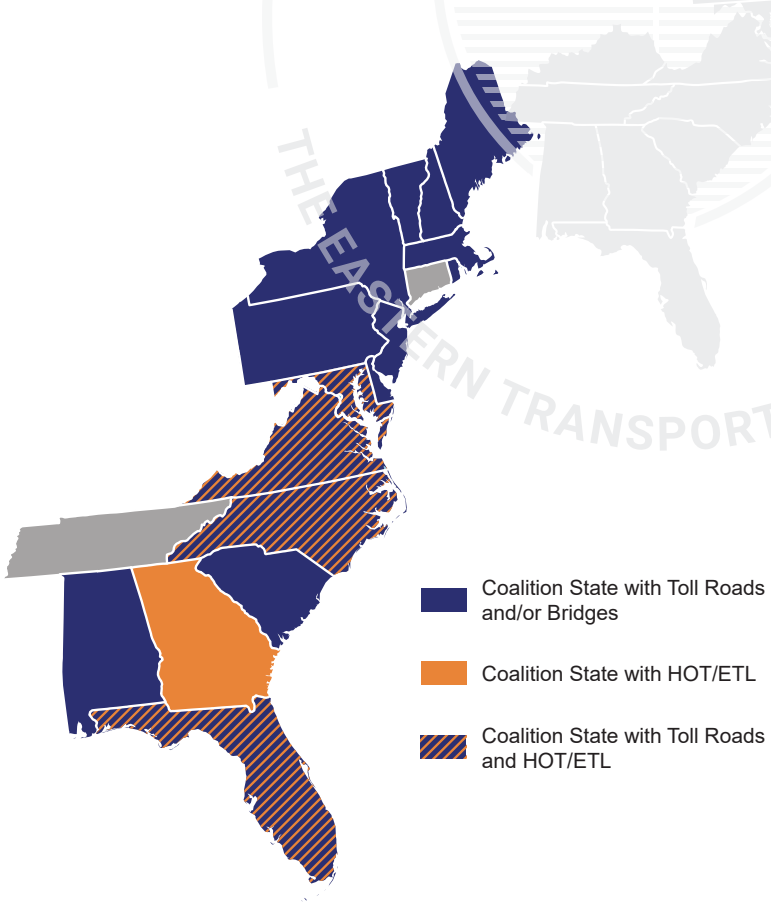


Figure 7-1: Coalition States with Toll Facilities

7.1 Tolling Back Office as MBUF Account Manager

The Coalition partnered with Transurban, an international toll road operator, to conduct the 2021 Tolling Entity-Led Pilot. The purpose of this pilot was to determine whether tolling back offices could be leveraged to administer MBUF and thus reduce administrative costs. Such cost savings are considered likely given the many parallel activities that exist between MBUF account management activities and tolling back-office operations. These include account creation, data collection, transaction processing, invoicing, compliance, and customer service. These potential synergies could provide economies of scale and efficiencies in a future MBUF system.

The Coalition's 2021 Tolling Entity-Led Pilot took place in Northern Virginia from July 2021 to October 2021 (see Figure 7-2).

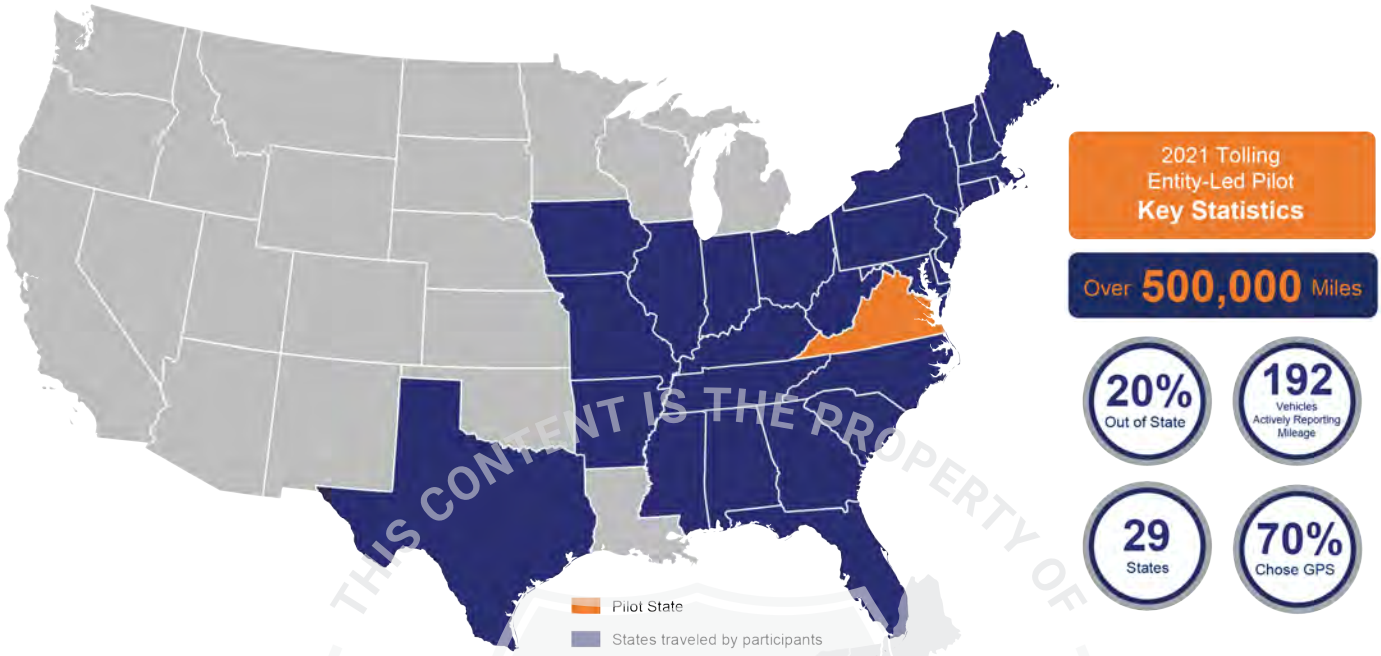


Figure 7-2: 2021 Tolling Entity-Led Pilot Key Statistics

Transurban provided three mileage reporting options (see Table 7-1) and account management services for this pilot. The 2021 Tolling Entity-Led Pilot participants came from a mix of existing Transurban customers and individuals from the general public, with recruitment methods ranging from email list invitations to public media outreach in prominent regional media outlets. Qualified participants were provided an incentive for participating in the pilot and providing feedback via the pre- and post-pilot surveys.

Table 7-1: 2021 Tolling Synergy Pilot Mileage Reporting Options and Participants

Mileage Reporting Option	Number of Participants
OBD-II plug-in with GPS*	161
OBD-II plug-in without GPS*	28
Manual (monthly odometer reporting)	3

** Number of participants only includes those that activated their devices and reported mileage during the pilot.*

7.1.1 Results

The 2021 Tolling Entity-Led Pilot demonstrated that a toll road operator can successfully provide the necessary MBUF account management activities. Transurban collected fuel usage and mileage data to determine the simulated MBUF payments for participants, distributed monthly statements, and provided customer service.

Transurban operated the pilot "Help Desk" in accordance with the system requirements, with minor adjustments to the preferred customer service channels utilizing a version of Transurban's customer service approach. This customer service strategy, commonly referred to as a "digital first" approach, parallels the strategy Transurban uses in existing services and products. In this pilot, pilot participants could submit inquiries to a direct email address or to a dedicated Account Management site accessed through their dashboard. Participants could categorize inquiries by type of required assistance, allowing the Transurban team to determine the type of assistance needed before reaching out to the individual. After reviewing the inquiry, the Transurban team determined whether an email reply was sufficient or whether additional help was needed to guide the participant. Additionally, a 1-800 number was available in the rare event a participant issue was particularly complex and warranted a scheduled phone call. The vast majority of participants who required customer service said they received a useful answer and in a timely fashion.

Though many of the activities required for MBUF were already in place for Transurban's tolling system operations, the initial system adaptation required for MBUF collection presented certain challenges. These include working with MBUF technology providers, adhering to MBUF system requirements, and developing MBUF-specific communications and statement formats. By combining the toll entity and the project team MBUF experience, the 2021 Tolling Entity-Led Pilot successfully tested, operated, and delivered an MBUF system.

7.2 MBUF Technology and Tolls

Building on the Coalition's work completed in 2018 and 2019 regarding whether MBUF technology could be used to estimate tolls, the 2020-2021 MBUF Work concluded its tolling exploration by determining the optimal tolling facility layouts, plaza configurations, and operational scenarios where GPS-based MBUF technologies could be used to accurately collect tolls. This work also provided a combined "all costs" statement detailing both MBUF and tolling charges as well as congestion mitigation charges as appropriate (see Section 8). Only passenger vehicles were included in this work and testing occurred on specific tolling facilities in Delaware, New Jersey, North Carolina, Pennsylvania, and Northern Virginia as described in Table 7-2.

Table 7-2: Facilities Included in Tolling Analysis

Delaware	New Jersey	North Carolina	Pennsylvania	Northern Virginia
• DE I-95 * • DE SR -1 * • Delaware River Memorial Bridge* • U.S. 301 in Delaware**	• NJ Turnpike (between southern terminus and exit 13)	• Monroe Expressway (U.S. 74 bypass around Charlotte) • Triangle Expressway (NC 540 and NC147 around Raleigh)	• PA Turnpike mainline**	• I-95 HOT lanes between I-495 and Stafford County*** • I-495 HOT lanes (Capital Beltway between I-95 and MD state line)*** • Dulles Access Toll Road (between I-495 and Dulles Airport) • I-395 HOT lanes *** • I-66 Express Toll Lanes

**Also included in the 2018 and 2019 pilots*

*** Also included in the 2019 pilot*

****Transurban-operated facility*

7.2.1 2020-2021 State Passenger Vehicle Pilot

Azuga tested the synergies between tolling and MBUF for the toll facilities in Delaware, New Jersey, North Carolina and Pennsylvania, continuing their work from the previous years. The purpose of this testing was to examine the ability of MBUF technologies (with location capability) to accurately collect tolls for existing toll facilities – matching the results associated with current tolling collection technologies. This examination considered a wide array of existing plaza configurations and the many approaches for assessing tolls, including discount programs.

Toll zones were set up to mimic existing toll plazas using geofencing based on latitude/longitude coordinates. Toll rate tables were then developed to match existing E-ZPass /Quick Pass rates, with the project team conducting initial testing. There were no data links or integration between Azuga and the tolling back offices. During the pilot, a small group of volunteers among the 2020-2021 State Passenger Vehicle Pilot participants provided their monthly E-ZPass/Quick Pass statements to compare with the tolling information collected by the GPS-based MBUF technology. This comparison helped determine whether the vehicle was captured by the MBUF system when it passed through a toll plaza and whether the estimated MBUF charge was accurate.

7.2.2 2021 Tolling Entity Led-Pilot

The 2021 Tolling Entity-Led Pilot included an evaluation of the accuracy of MBUF technology in estimating tolls. The test combined the delivered MBUF system for the 2021 pilot with that of Transurban's existing GoToll app, which involves collection of trip data and enforcement through typically available video tolling solutions on all electronic tolling assets.[3] Beyond testing the MBUF integration with a real tolling product in this scenario, Transurban also evaluated whether OBD-II GPS-based plug-in devices could accurately identify existing toll locations.

7.2.3 Results

The testing conducted across the 2018, 2019 and 2020-2021 passenger vehicle pilots found that MBUF plug-in devices with existing GPS technology can accurately calculate tolls – relative to existing tolling technology – when certain facility layouts and plaza configurations are in place. Below, Table 7-3 shows synergies existing with existing tolling technology as well as existing MBUF GPS-based technology.

Table 7-3: Tolling and MBUF Technology Synergies

Plaza Configuration / Collection Approach	With existing tolling technology (e.g., readers, cameras, apps) as used by Transurban	With existing MBUF plug-in technology with GPS
Mainline barrier and ramp tolls – single direction and separated from other direction of traffic	✓	✓
Bi-directional mainline plazas with little separation between travel directions	✓	—
Bi-directional ramp plazas with little separation between travel directions	✓	—
Express toll lanes in close proximity to general purpose lanes (same direction)	✓	✗
Cumulative tolls collected as vehicle passes under gantry	✓	✓
Tolls calculated based on vehicle entry and exit locations	✓	—
Legend: ✓= Compatible with existing technology ✗= Incompatible with existing technology —= Inconclusive – more analysis needed		

3 Based on previous testing of possible GoToll approaches, GPS is not a part of the product due to several limitations with GPS, many of which were also identified in this and previous Coalition pilots.

The MBUF plug-in device with GPS had the best tolling accuracy at single-directional toll plazas that are at least 8 feet from other traffic flows or toll plazas. Examples of these configurations include the North Carolina toll roads, the Delaware River Memorial Bridge southbound direction,[4] the Dulles Toll Road, and the reversible I-95 Express Lanes in Northern Virginia, all of which achieved close to 100% accuracy.[5]

As shown in Table 7-3, there are several configurations and/or operational scenarios that are inconclusive on whether they can consistently and accurately calculate tolls using current GPS-based MBUF technology. Several toll roads (e.g., Delaware SR-1, New Jersey Turnpike and Pennsylvania Turnpike) primarily consist of bi-directional plazas on ramps and on the mainline (see Figure 7-3) where the distance between adjacent travel lanes with opposite directions is less than 8 feet. This potentially results in situations where vehicles traveling in one direction could be erroneously detected by the toll zone for the other direction. Toll collection accuracy for these types of locations varied between 70 and 85%. This is the result of GPS drift, which is the difference between a vehicle's actual location and the location recorded by the GPS receiver.[6]

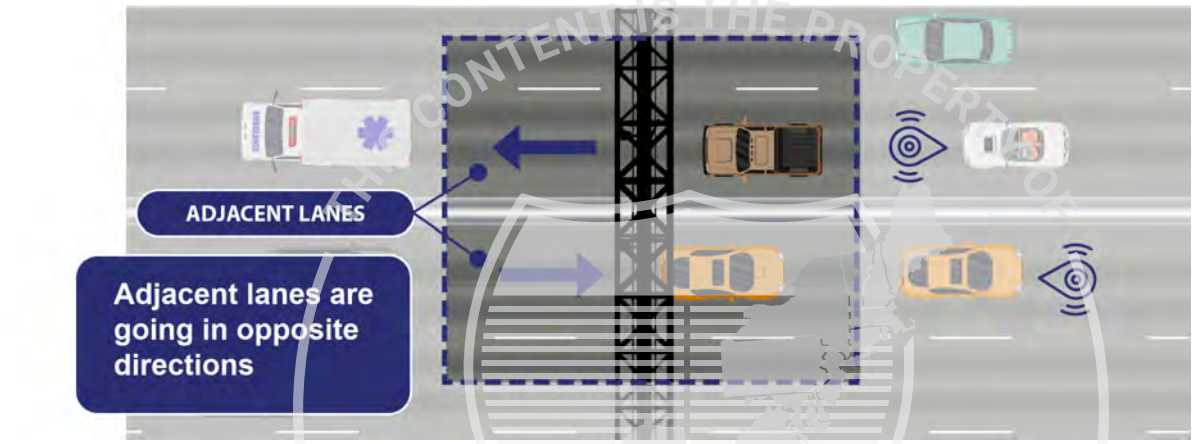


Figure 7-3: Bi-Directional Ramp Tolls (Same Plaza)

Another inconclusive toll plaza configuration involves ETL and HOT lanes where the tolled lanes are in close proximity to general purpose lanes with only a few feet of separation and with vehicles in both sets of lanes traveling in the same direction (e.g., on the I-495 Capital Beltway in northern Virginia). An example of this configuration is shown in Figure 7-4. The testing indicated 100% accuracy between the toll charges, as measured by the Transurban GoToll product and the data from the GPS-based plug-in devices for vehicles traveling in the toll lanes. This testing was not aimed at addressing potential false positives when a vehicle travels in the general purpose lanes but is still identified as passing through the toll zone (due to GPS drift). However, based on the other results from the Tolling Synergies test, a GPS-based approach would likely result in false positives and a reduction of accuracy as it pertains to vehicles traveling in the general purpose lanes.

Another potential issue with ETL and HOT operations from a MBUF account management perspective is that the charges typically vary based on congestion levels, and the tolls can change every 10 minutes. To obtain this information, an MBUF account manager would need access to this variable rate information

4 The Delaware River Memorial Bridge plaza is located approximately 100 yards from the northbound roadway, which is not tolled.

5 The NC toll roads achieved 95% accuracy, which likely would have improved with additional fine tuning of toll zones

6 The GPS system is based on providing a range error of 6.6 feet with a 95% probability across all healthy satellites. Several factors can impact GPS accuracy, including weather, during individual trips and the surrounding infrastructure. The 8-foot value provides a cushion for outliers or if some satellites are not functioning properly.

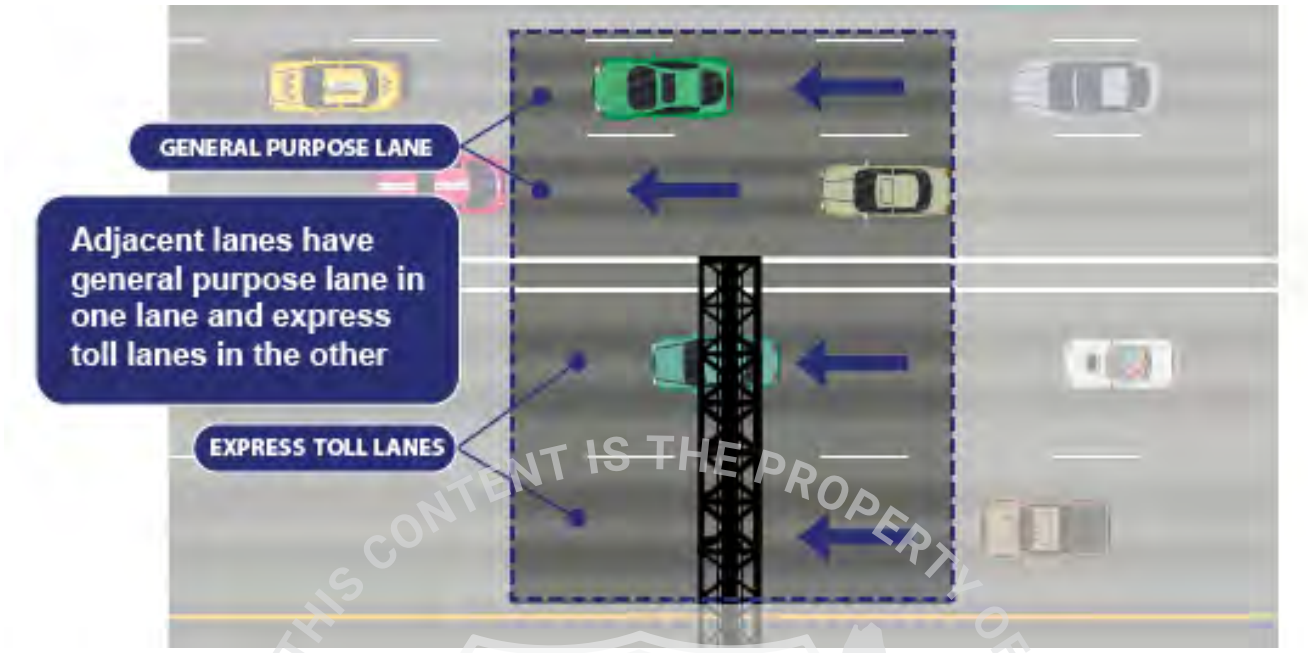


Figure 7-4: Express Toll Lanes in Close Proximity to General Purpose Lanes

in real-time, presumably via a data link with the associated tolling back office entity. This would not be an issue for the tolling entity.

The 2020-2021 State Passenger Vehicle Pilot tolling test results indicated that the optimal scenario for a GPS-based plug-in device approach occurs when tolls are charged in a cumulative manner as the vehicle passes through multiple single-direction plazas along a route (i.e., separate charge at each plaza regardless of where the vehicle entered the toll road).

Toll roads where the charge is calculated based on where the vehicle entered and subsequently exited the facility can be accommodated with GPS-based tolling. However, given that most of the toll roads included in this testing (i.e., Delaware, New Jersey, Pennsylvania) consist of bi-direction plazas that are mostly on ramps – locations that exhibited the lowest level of accuracy – the accuracy of this on-off toll calculation approach was also low.

Another concern with this tolling approach is that it requires a more complex rate table identifying the tolls for every combination of entry and exit points. Azuga was responsible for the somewhat onerous process of developing these tables during the pilot. The on-off calculation scenario was not an issue for the 2021 Tolling Entity-Led Pilot as Transurban could readily identify where and when vehicles entered and exited toll facilities managed by Transurban. This indicates the need for a data linkage between MBUF account managers and the tolling back offices for obtaining these tables and any updates.[7]

Accurately accommodating several discount programs, such as those for seniors, E-ZPass discounts, frequent users, and low-emission vehicles, will present a challenge in using GPS-based MBUF technology to calculate tolls as provided by an account manager. Accommodating multiple discount programs and the associated operational rules will increase costs for the MBUF account manager, unless back-office integration with the toll facility can be leveraged to address the various business rules.

7 During pilot operations, the NJ Turnpike changed their rates. In the interest of time and cost, Azuga was not required to change and update their associated rate tables. The differences in rates were accounted for during the evaluation process.

Putting the results from these tests into context, it is important to note that the GPS-based plug in devices used were initially developed for the insurance industry and are not optimized for toll collection, nor was any such optimization attempted during the pilots. As MBUF technology advances, the gap between current and needed performance could be closed. Future enhancements could include:

- Bi-directional geofence capability, based in part on the lessons learned from the Coalition pilots, that provides the ability to determine directions within the toll zone. Knowing the direction of vehicles as they pass through a bi-directions plaza should solve some, if not all, of the accuracy issues encountered with bi-directional plazas where the lanes for different directions are very close to one another (8 feet or less) or in which the direction of travel through the lane might change depending on time of day.
- Additional calibration, particularly with respect to the accuracy of the latitudinal and longitudinal coordinates of the existing toll plazas to improve accuracy.
- Testing of other available location technologies. GPS refers to the North American global positioning system, using only North American satellite constellation system. Global Navigation Satellite Systems (GNSS) can use navigational satellites from other networks beyond the GPS system, and more satellites means increased receiver accuracy and reliability. For example, the European Union's GNSS-based Galileo system has a reported accuracy (i.e., "drift") of 3-4 feet. This accuracy would significantly improve the results for closely spaced lanes of different directions and toll – general purpose lanes moving in the same direction.

Even with these possible improvements, there still remains an important limitation to integrating pure location-based MBUF mileage reporting and tolling as tested in Delaware, New Jersey, North Carolina, and Pennsylvania. This integration path only works when location-based technology is utilized for MBUF and within a specific set of tolling scenarios as outlined on the right column of Table 7-3, including cumulative, non-variable tolling as a vehicle passes through each gantry. As such, a location-based MBUF is unlikely to fully replace toll tags and plaza infrastructure (including camera-based license plate reading). Moreover, any tolling approach based on location-based MBUF technology will not be able to accommodate those drivers who choose non-location due to privacy concerns.

Future Integration of MBUF into Tolling Operations

Testing provided by Transurban in Northern Virginia confirmed the ability for a toll operator to provide MBUF services to customers and clients at scale, with additional benefits of drawing on existing extensive experience in areas of public education, privacy, enforcement, security, and technology uplift. The potential for future integration of MBUF account management activities into the tolling back-office operations, and potential synergies and economies of scale, were also initially explored. Potential synergies and cost advantages of such an approach are summarized in Table 7-4.

Table 7-4: Potential Synergies and Advantages of Integrating MBUF into Tolling Operations

Advantage	Description
Scalability	• Tolling operators already manage and process hundreds of thousands of trips and transactions annually (compared to a few thousand participants, at most, in MBUF pilots to date). • Experiences gained in developing tolling applications is transferred to development of MBUF applications, thus enabling creation of fully scalable, production-grade solutions.
Customer Service	• Existing customer facing process and tools directly transfer from tolling products to MBUF focused services, including payment, ensuring security and operations. • Workforce resources, including customer service and help desk already trained to work within the nuanced world of tolling, can be rapidly trained to provide MBUF services. • Tolling owner operators use end-to-end account management, ensuring a consistent and connected customer experience from information provided via telephone, interactive voice response, and interactive support dashboards.
Privacy and Data Security	• Longstanding experience protecting information related to customer locations can be readily extended from tolling to MBUF products. • Architecture used within the environment leverages industry leading best practices for privacy and security, including features such as multiple virtual private clouds to separate and secure system components. • Understanding and limiting of the data collected and stored from customers to that which is needed to support the required system functionality.
Education	• Tolling (and MBUF) as products can be a difficult sell to both governments and individual consumers due to a combination of factors, including negative connotations of what a tolling business does and relative lack of understanding of how infrastructure is funded and maintained. Due to this, tolling owner-operators maintain a skill set in providing the broader public, customers, and stakeholders with the knowledge and tools needed to limit misunderstanding, creating a smoother transition into a new policy or product. • Tolling operators have extensive knowledge of internal and public facing materials required to administer a tolling (and, similarly, MBUF) product, including frequently asked questions, contact options ranging from phone to email and support pages and customer portals.
Technology Considerations	• Modular and cloud-based architectures. • Agnostic data sources (ability to obtain and process data from multiple sources).

In summary, integrating MBUF into existing tolling systems would appear to allow for reduction in set-up and operating costs with synergy across services from technology and customer support standpoints. A reduction in resources would further be achieved with enforcement and customer inquiries for services falling into a single system, allowing for cross checking and verification of user information, potentially reducing the num-ber of inquiries and public education required over time.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08 Congestion Mitigation Using MBUF Technology

To align with the 2019 STSFA requirements,[8] the Coalition's 2020-2021 MBUF Work explored whether MBUF technology could be used to provide congestion mitigation during particular times of day or for particular geographic zones. The Coalition conducted two congestion mitigation tests: one in Pennsylvania and one in Northern Virginia as part of the Tolling Entity-Led Pilot.

Pennsylvania Test

A small group of Pennsylvania residents, including members of the project team—all using the plug-in device with GPS—participated in the Pennsylvania test. The congestion mitigation participants were issued an additional simulated charge for the following pricing scenarios:

- Time of Day (TOD) Charging: An additional charge of 20 cents/mile on any mileage accrued in the state of Pennsylvania between the a.m. peak (6:30-9:30 a.m.) and the p.m. peak (4-6:30 p.m.).
- An additional surcharge of $5.00 when entering the Harrisburg Central Business District during the a.m. peak and p.m. peak periods defined for the TOD scenario (see Figure 8-1).

The congestion charging participants kept a log with dates and times they drove into the Harrisburg Central Business District. These logs were compared to the monthly congestion mitigation statements, which was a separate statement provided by the account manager, Azuga (sample statement included in Appendix A). No participant logging was required for the TOD attribute of this test.

Figure 8-1: Harrisburg, Pennsylvania Congestion Mitigation Zone

8 Per the 2019 STSFA Notice of Funding Opportunity "The application shall address...Congestion mitigation impacts – To the extent market forces or governmental incentives under the mechanism might positively or negatively affect roadway congestion or be used to leverage congestion reduction strategies, those impacts should be addressed in the proposal."

Northern Virginia Test

Additionally, a small group of Northern Virginia residents, including Transurban staff and members of the project team—all using the plug-in device with GPS—participated in Northern Virginia test. The congestion mitigation participants were issued an additional mock charge for the following pricing scenarios:

- TOD Charging: An additional charge of 5 cents/mile on any mileage accrued in the state of Virginia between the a.m. peak (6 -10 a.m.) and the p.m. peak (3 -7 p.m.). This included mileage in the cordon zone.
- An additional surcharge of $5.00 upon the first entry into the Tysons Corner area zone —located in a satellite city in the Northern Virginia area outside Washington, D.C.—between 6 a.m. and 7 p.m. (see Figure 8-2). The centerline of the road was used to establish the boundary of the congestion mitigation zone.

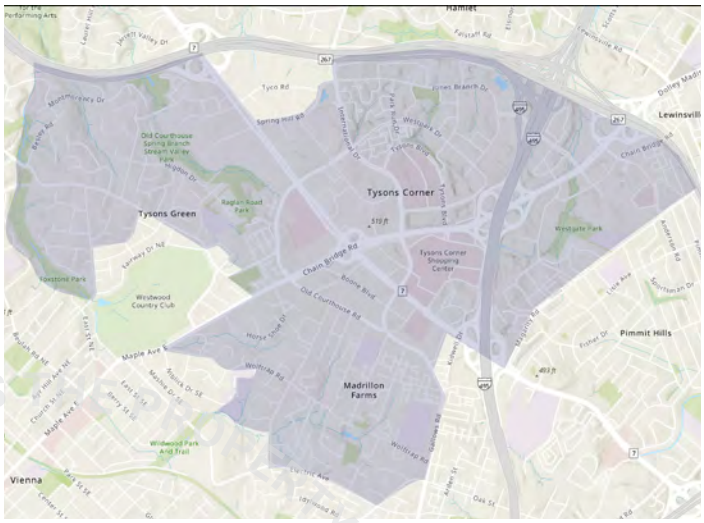

Figure 8-2: Northern Virginia Congestion Mitigation Zone

Transurban recorded vehicle movement of participants in the vicinity of the congestion mitigation zone to help determine whether vehicles on the congestion mitigation zone boundaries should be charged.

Congestion Mitigation Test Results

Based on the data received from the small group of congestion mitigation test participants, it appears that GPS-based **MBUF technology can be used for congestion mitigation**. Several lessons learned resulted from this initial test and are summarized below:

- Cordon area design requires careful planning to ensure only portions intended to be charged are covered. In both congestion mitigation tests, publicly available maps were used to define the zones, requiring some adjustments after initial testing to avoid overlap of unintended areas and to improve accuracy.
- Creation of buffer zones around the zone should be considered to avoid false positives or negative cordon charges for individuals who are driving on or near the edge of the cordon. In one scenario with the Tysons Corner zone, the boundary line was the center-line of a roadway, so a vehicle driving along this boundary roadway was viewed as in the zone, then out, then in again over a few block stretch due to GPS-drift.
- Trip polylines as calculated from plug-in devices with GPS used in this test may not always fully represent the real-world trip taken by the driver. It was found that GPS-coordinate accuracy variances in the tested devices can throw off polyline calculation logic enough to cause the system to believe that the participant took a different path.
- Zone configuration and business rules need to consider the impact and charging approaches if an expressway runs through the zone (such as the Capital Beltway through the Tysons Corner zone).

Future issues to address may include how to implement cordon pricing for drivers who do not choose GPS and the ability of the MBUF system to only charge the TOD amount on selected roadways and facilities.

09 Key Findings

The 2020-2021 MBUF Work resulted in five key findings:

1. Understanding the Complexity of the User Matters
2. Real-World Pilots Reduce Privacy Concerns
3. Leveraging Technology Creates Solutions
4. A Tiered Rate Based on MPG Doesn't Work
5. Customized Outreach Needed to Move MBUF Forward

These findings will be discussed in the following sections.

9.1 Understanding the Complexity of the **User Matters**

9.1.1 Trucks: Heavy Users, Heavy Payers, and Heavily Regulated

Trucks are subject to multiple taxes and fees for road use. In addition to fuel tax, there are many other additional state and federal fees and reporting requirements, such as HVUT, WDTs in four states, FET, Federal Tire Taxes, and tolls. Along with these fees, there are also multiple regulations with which truckers must comply (see Table 9-1).

Although trucks travel much greater distances each year when compared to passenger vehicles, the recurring costs of fuel taxes and other fees contributed to the HTF exclusively by trucks is exponentially higher.

Table 9-1 Taxes and Terms on Trucks

What	How much	Terms	Where	How often
State Excise Tax on Diesel	$0.17 - $0.795 per gallon (State) $0.244 (Fed)	Varies per state, except Oregon has no excise tax on diesel	Paid at the pump (or bulk deliveries)	When fuel is purchased
Heavy Vehicle Use Tax	$100 + $22 per 1,000 pounds over 55,001. Maximum of $550 per vehicle	All trucks over 55,001 pounds	Issued by IRS	Annually
Weight Distance Tax	Varies by state	Travel through state with WDT	KY, NM, NY, and OR	Varies, mostly quarterly
Federal Excise Tax	12%	Retail purchase of new truck	Dealer	New purchases only
Federal Tire Tax	Tires over 40 pounds $.015 per pound up to $10.50 + $0.50 per pound over 90 pounds	Based on weight of tire	At Dealer/Retailer	When purchased
Toll Roads	Varies	Varies	Approximately 28 states	When road is traveled
Unified Carrier Registration	Tiered rates vary from $59 (0-2 Vehicles) to $56,977 (1,000 or more vehicles)	Applies to interstate trucks 10,001 pounds or greater; Vehicles hauling HazMat; vehicles hauling 10 or more passengers, including the driver	National Registry System or Base State (41 participating states)	Annually

Table 9-2 and Figure 9-1 provide a snapshot of the total Federal Highway Revenue in 2019 and clearly reveals that trucks contribute the bulk of the revenue going into the Federal Highway Trust Fund (HTF).

Table 9-2: Federal Highway Revenue in 2019

Fed Excise Tax – FE09	Total Revenue Distributed to all states	Percent of Total Revenue from HTF	Who pays
Gas	$22,024,406,000	57.4%	Primarily passenger (light-duty) vehicles
Diesel	$9,190,515,000	24%	Primarily trucks (medium, heavy-duty vehicles)
HVUT	$1,285,160,000	3.3%	Trucks 55,000 pounds or more
FET	$5,329,676,000	13.9%	New truck/trailer tax
Tire Tax	$534,574,000	1.4%	New truck tires
Totals	$38,364,331,000	100%	

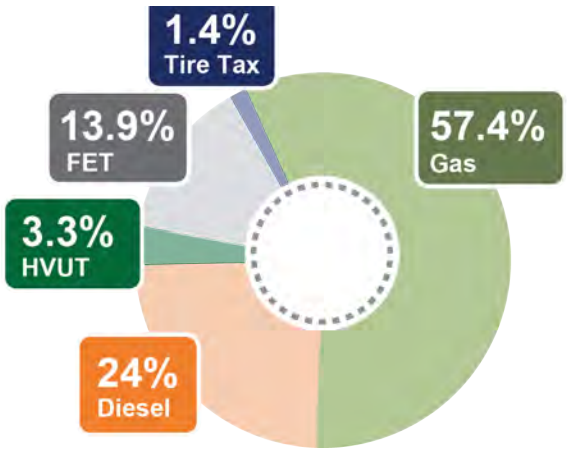

Figure 9-1: Federal Highway Revenue in 2019

> "It is imperative for any future highway funding alternatives to improve reporting and regulatory compliance and not set the industry back."
> -Motor Carrier Working Group

A deeper dive into federal highway revenue shows that only about 9.75% of the highway miles during that same period were traveled by trucks, yet 37% of the revenue distributed back to the states was the result of trucks (see Table 9-3).

Table 9-3: Federal Highway Revenue in 2019 by Vehicle Type

Fed Excise Taxes – FE09	Total Revenue Contributed	Percent of Total Revenue into HTF (Trucks)	Vehicle Type	Total Road Miles – All Vehicles	Percent of Total Vehicle Miles Traveled (VMT)
Diesel	7,075,696,550	18.5%	LD-Cars/M-cycles	2,273,997	69.7%
HVUT	1,285,160,000	3.3%	LD-Long Wheel	669,744	20.5%
FET	5,329,676,000	13.9%	Truck Single-Unit/ Bus	142,726	4.4%
Tire Tax	534,574,000	1.4%	Truck Combo	184,165	5.4%
Totals	$38,364,331,000	37.1%	Total all VMT	3,261,772	100%

These data show that although trucks travel much greater distances each year when compared to passenger vehicles, the recurring costs of fuel taxes and other fees contributed to the HTF exclusively by trucks is notably higher.

The motor carrier industry is adamant that MBUF cannot become another layer of complexity in a highly regulated and taxed environment. The MCWG has repeatedly stated, **"It is imperative for any future highway funding alternatives to improve reporting and regulatory compliance and not set the industry back."**

9.1.2 Passenger Vehicles: Rural Drivers May Fare Better with MBUF

A persistent concern voiced in conversations around MBUF is that rural drivers would pay more under an MBUF model than they do under the current fuel tax structure. This concern likely stems from the fact that rural drivers tend to drive more than their urban counterparts. The Coalition's Geographic Equity Analysis confirmed that rural drivers do drive more than those in other geographies (see Table 9-4). In general, this additional mileage translates to more fuel used and therefore more fuel tax paid by mixed and rural households relative to their urban counterparts. However, the Coalition's Geographic Equity Analysis indicates that rural drivers may pay less with MBUF than they do with current fuel tax structures, and that most drivers—regardless of geography—would be minimally impacted by a shift to MBUF that uses a single, revenue neutral rate applied to all passenger vehicles.

Table 9-4: State-by-State Comparison of Daily Vehicle Miles Traveled per Household by Geography Type

	LM Urban	LM Suburban	Small Urban	All Urban	Mixed	Rural
Delaware	36.0	42.1	38.7	38.7	57.2	54.1
New Jersey	27.1	47.7	36.1	34.3	57.5	N/A
North Carolina	36.6	41.7	36.9	39.8	55.6	52.0
Pennsylvania	25.0	45.9	31.4	33.0	56.2	52.1

If the fuel tax were replaced with a single, revenue neutral, per-mile fee in an MBUF system, drivers in most rural areas would pay $9 to $34 less in annual fuel costs than they do now (see Figure 9-2).

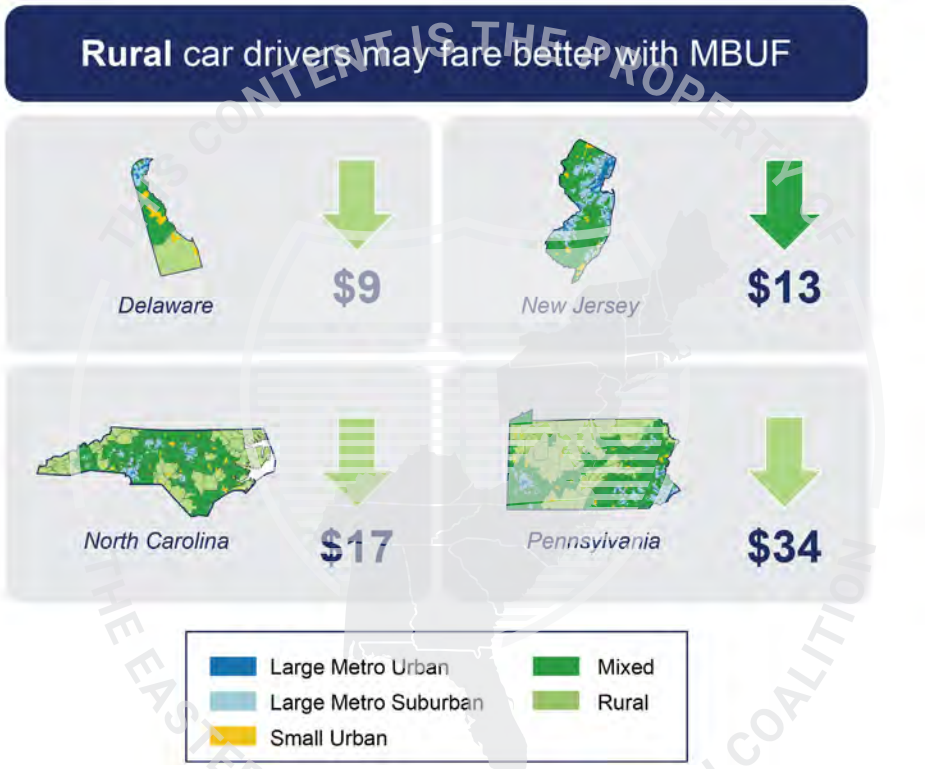

Figure 9-2 Comparing MBUF to Fuel Taxes – Average Annual Change per Household

As discussed in Chapter 5, the reason for this impact has less to do with how much people drive, and more to do with the fuel efficiency of the vehicle they drive. Urban households tend to have more fuel-efficient vehicles than rural households and therefore generally pay less fuel tax per mile driven than rural households (see Table 9-5). However, a shift to MBUF would base charges on road impact rather than fuel efficiency and consumption; because of this, rural households would pay less toward transportation funding than they do currently.

Table 9-5: State-by-State Comparison of Average Fuel Efficiency by Geography Type

Classification	Average Vehicle Fuel Efficiency (MPG)			
	Delaware	New Jersey	North Carolina	Pennsylvania
LM Urban	21.4	21.5	22.7	21.6
LM Suburban	21.3	21.4	21.9	21.4
Small Urban	20.7	20.5	21.1	20.8
Mixed	20.5	20.5	20.6	20.3
Rural	20.0	N/A	20.1	19.6
All Urban	21.1	21.4	21.2	21.5

These findings are in line with work conducted by the Western Road Usage Charge Consortium (RUC West). The RUC West analysis found similar results: rural households would pay less under a revenue neutral MBUF than under a fuel tax. Notably, the RUC West study only considered urban, mixed, and rural geographies, whereas the Coalition's Geographic Equity Analysis included LM suburban and small urban areas as well. The greater level of detail in the Coalition study was designed to capture the more nuanced differences in travel behavior between core and suburban portions of large cities, between large and small urban areas, and between less dense areas with and without close ties to urban areas. Though public opinion surveys across the country have highlighted the prevalence of the public's belief that MBUF will harm rural communities, real-world data analysis consistently shows this is not the case. Sharing these results with key stakeholders and legislators was a key part of the Coalitions' 2020-2021 MBUF Work. Additional conversations will be necessary, but showing what rural communities are paying today compared to an MBUF approach is an important step.

9.2 Real-World Pilots Reduce Privacy Concerns

MBUF pilots and programs help reduce privacy concerns by providing drivers a real-world experience with MBUF technology, offering mileage reporting choices including a non-GPS option, and by establishing sufficient data privacy and security protections as part of MBUF system requirements.

9.2.1 Participant Feedback

Pilot participants in all Coalition motor carrier and passenger vehicle pilots to date have expressed concerns that an MBUF program might impact privacy and security of personal information. For example, in both the 2019 Passenger Vehicle Pilot (members of the general public) and the 2020-2021 State Passenger Vehicle Pilot (transportation stakeholders), 46% of participants joined the pilot to understand how privacy would be protected and data kept secure. In interviews, 60% of National Truck Pilot participants also stated that privacy is "very important", and 40% stated that data security is "very important."

Though many passenger vehicle pilot participants initially expressed concerns about privacy, these concerns dropped significantly after drivers experienced MBUF. In the 2019 Passenger Vehicle Pilot, for instance, concerns about privacy fell from 49% to 20%. Participants in the 2020-2021 State Passenger Vehicle Pilot showed an even more dramatic drop in privacy concerns, going from 52% to 7% during the course of the pilot (see Figure 9-3).

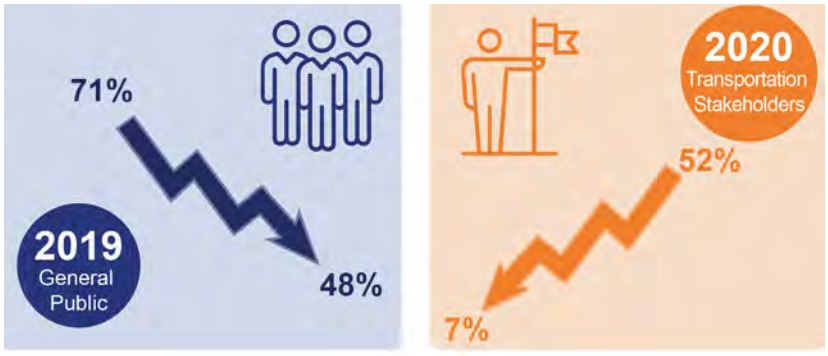

Figure 9-3 2020-2021 State Passenger Vehicle Pilot Participant Concerns About Privacy As Stated in Pre- and Post-Pilot Surveys

Additionally, 2020-2021 State Passenger Vehicle Pilot focus group participants expressed the view that administrators of any future MBUF program should provide the public with safeguards to ensure that personal information would not be shared with law enforcement, insurance companies, or commercial marketing entities. Focus group participants also recommended that any personal information should be deleted or anonymized frequently and that program administrators should be audited regularly. Providing such safeguards and auditing, they believed, would alleviate public concerns about privacy and security of personal information. By the end of the pilot, concerns about privacy and security of information decreased significantly across all four states (see Figure 9-4).

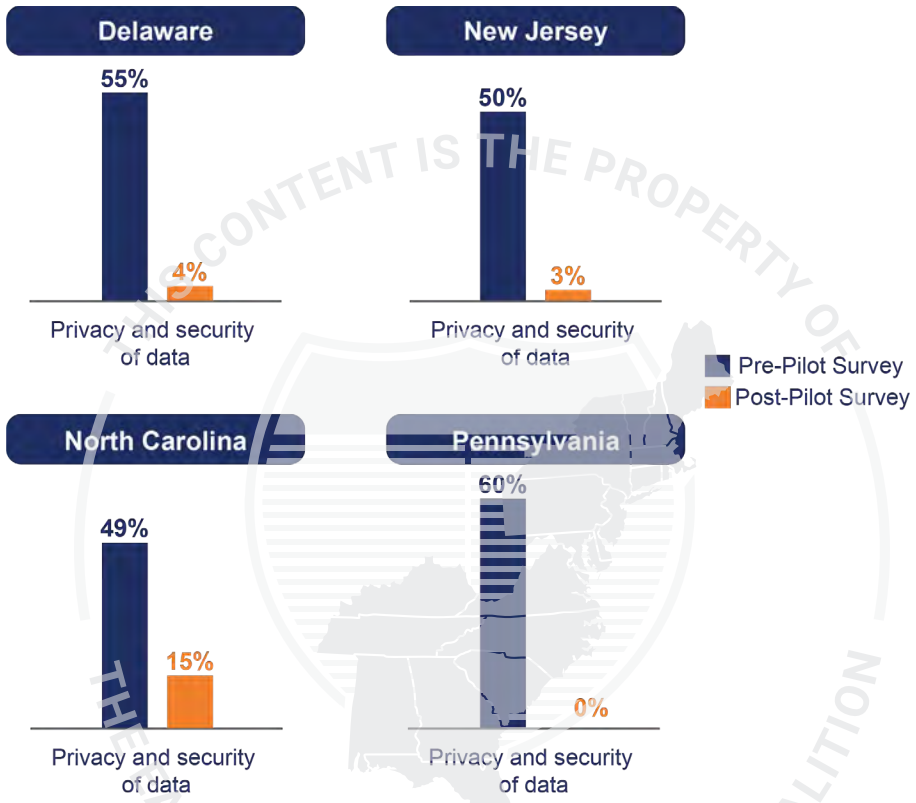

Figure 9-4 2020-2021 State Passenger Vehicle Pilot Concerns About Privacy by State

Concerns about privacy and security of personal information may be diminishing as both truck and passenger vehicle drivers become more accustomed to the use of reporting technology in their everyday lives. Many 2020-2021 State Passenger Vehicle Pilot focus group participants expressed the view that they have become more accepting of technologies—internet, smartphones, even Fitbits—that report on their whereabouts and behavior, in part because such technologies have become more commonplace and also provide tangible benefits.

9.2.2 Mitigating Privacy Concerns

Trucks

For trucks, the participant agreement (see Appendix C) stated that all personally identifiable information would be destroyed within 60 days of pilot completion and that redacted and non-personal information would be retained. This disclosure provided the participants with assurance their data was protected.

Under IRP and IFTA, reporting all distance by state is a requirement for trucks involved in interstate commerce. The framework of these programs provides both the motor carriers and jurisdictions with privacy and data protection. Highlighting how data is already collected, used, and stored for jurisdictional purposes alleviates the concern among the motor carriers regarding privacy. Additionally, jurisdictions have to sign data repository and clearinghouse participation agreements to safeguard all taxpayer information.

Since the motor carrier industry is required to maintain jurisdictional distance, a non-GPS option was not given to trucks for the National Truck Pilot, but rather all participants were provided EROAD devices at no charge for use during the pilot.

Passenger Vehicles

Among passenger vehicle drivers, privacy and security concerns are often expressed as an aversion to being tracked. More specifically, they involve worries about data being shared with insurance companies, law enforcement, and marketing entities. To mitigate these concerns and increase driver satisfaction, providing mileage reporting options for passenger vehicles is crucial, as are stringent requirements limiting data access for providers. Options should include at least one approach that does not include GPS and an approach that doesn't require technology.

To further address concerns, the Coalition asked each participant to review and sign a pilot participant agreement (see excerpt in Figure 9-5; full agreement provided in Appendix C).

This agreement outlined the following aspects of the pilot's privacy and data security practices:

Figure 9-5 Reasons Behind Privacy Concern Drop in Passenger Vehicle Pilots

- **Transparency:** Participants were informed of which data would be collected by the MBUF account manager and how it would be used.
- **Limited Personal Data:** The personal information required for participation in the pilot was very limited (e.g., name, address, email, phone, and vehicle information) and was communicated to pilot participants.
- **Option to Decline GPS:** Location-based services were entirely optional and if participants were not comfortable providing location information, they could select the mileage reporting option that does not use location-based services.
- **Data Protections:** The account manager could not sell data to any third party entities and was required to destroy all data 30 days after the completion of the pilot.

> "Before implementing a system such as this, there needs to be more research done on concerns or issues with instituting MBUF. Some people may have privacy concerns."
> —New Jersey Participant

The agreement for passenger vehicles also mentioned non-personal data reports provided by the account manager to the Coalition. These reports did not reveal the participants' identity, driving activities, or personally identifiable details. Data included in these reports were sanitized and anonymized to protect participant privacy. Individual participants' data were never shared with the participating states or with the Coalition. Additionally, neither detailed location information (e.g., routes taken) nor information on driving behavior were provided to the Coalition, the Coalition member states, the project consultant team, or any third party.

9.3 Leveraging Technology Creates Solutions

The driving public recognizes the potential to leverage technology in transportation funding approaches. In the Coalition's statewide public opinion surveys, 49% to 61% of the general public saw the fuel tax as an out-of-date way to assess road usage and agreed that advances in technology should be leveraged for new funding approaches. For the motor carrier industry, the use of telematics and other on-board technology for fleet management and to meet regulatory requirements is widespread.

Participants in the 2020-2021 State Passenger Vehicle Pilot also expressed that an MBUF program has the potential to leverage new technology to address transportation challenges. In particular, participants stated interest in the possibility of using MBUF technology as a flexible tool for individual states.

Vehicle technology that can be leveraged for MBUF implementation already exists. For passenger vehicles, this technology includes the plug-in devices for the OBD-II port[9] and the associated vehicle data (included on nearly all cars model year 1996 and later), as well as the growing number of vehicles with embedded telematics supported by 4G and 5G wireless networks.[10] For trucks, this technology includes vehicle telematics, which can accurately capture jurisdictional distance without infringing on privacy. These technologies are already being leveraged by insurance companies to reward safe driving, as well as by the trucking industry for fleet management, reporting service hours, and maintaining safety.

The Coalition's 2020-2021 MBUF Work has explored leveraging MBUF technology for tolling and congestion mitigation; to accurately capture out-of-state mileage; and to ease the burden of mileage reporting on users.

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9 As the OBD standard was initially developed to support emissions testing, not all EVs come equipped with the port.

10 Per the "Smart Car" blog (https://smartcar.com/blog/what-is-embedded-telematics/), 80% of new vehicles sold in the US feature embedded telematics.

"Internally my people were able to use it, didn't come back with questions, and we were able to substantiate, and it was all good data that we could look at and see this is data we could use in our calculations." - National Truck Pilot Participant

"Everything worked fine for me. It was simple. Really, it was just plug it in and turn the vehicle on." - Pennsylvania Participant

"[The technology] worked well. No complaints or issues." - Delaware Participant

9.3.1 Simplifying Mileage Reporting

An MBUF system and its associated technology are often thought to be too complicated to implement because of the perceived burden of reporting mileage. In statewide public opinion surveys, for example, about two-thirds of general public respondents identified the perceived "hassle" of reporting and paying as being a primary reason to oppose an MBUF system (see Figure 9-6). In the Coalition's 2020-2021 MBUF Work, pilot participants, however, consistently reported that MBUF technology is easy to use. This highlights the value of pilots to provide drivers first-hand experience that helps reduce their initial concerns with MBUF.

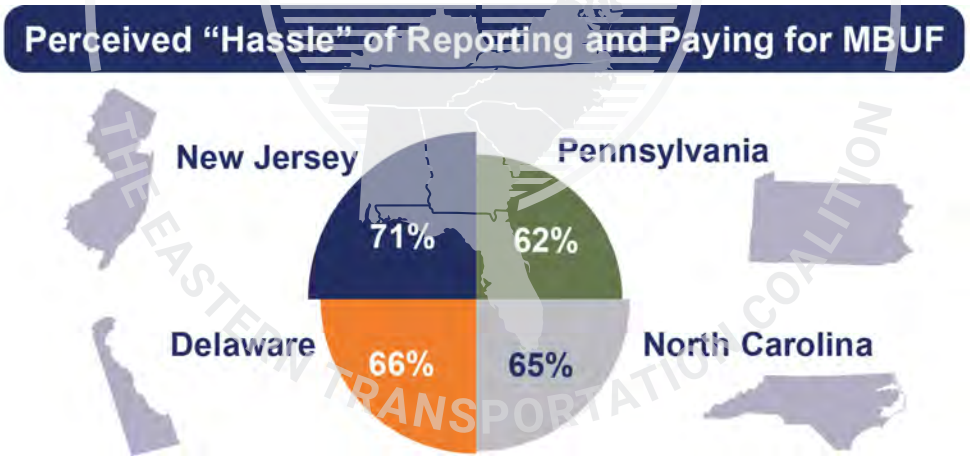

Figure 9-6 Statewide Public Opinions on the Perceived "Hassle" of Reporting and Paying for MBUF

Participants in the National Truck Pilot initially expressed concerns that MBUF reporting would be burdensome and complex. However, all surveyed National Truck Pilot participants expressed satisfaction with the ease of MBUF reporting. For trucks, the use of telematics and other on-board technology simplifies recordkeeping for both the drivers and the companies they work for by providing a secure, hassle-free way to record and report distance.

The telematics devices used in the pilot were provided and installed by EROAD at no cost to participants. The devices provided a no-fuss way to participate in the MBUF pilot.

Additionally, participants received a monthly statement (see Appendix A) that reported information the devices captured, including IFTA obligations and state-by-state MBUF comparisons. Participants indicated that these monthly reports as well as the telematics devices accurately captured relevant data and provided useful information they could use in other aspects of their business. Motor carriers are already subject to numerous fees and reporting requirements (see previous Table 9-1). Consolidating some or all of these requirements into MBUF would not only ease the burden on the trucking industry, but also has the potential to reduce the administrative costs associated with MBUF by eliminating costs in other areas.

2020-2021 State Passenger Vehicle Pilot participants also found the MBUF system and technology less complex than they expected. For example, participant survey respondents and focus group participants found the enrollment process easy, saying it was easy to plug in the device into their OBD-II port, download the app, and set up their account (Figure 9-7).

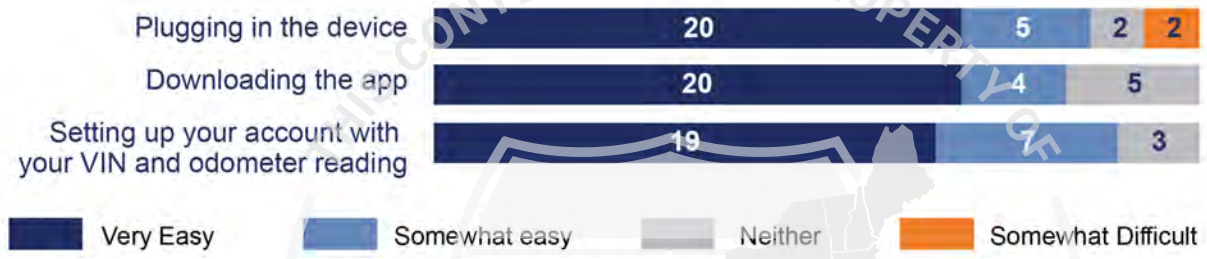

Figure 9-7 2020-2021 State Passenger Vehicle Pilot Focus Group Views on Ease of Enrollment

Perceptions of ease continued throughout the pilot. In post-pilot surveys, 89% of pilot participants who chose the plug-in device with GPS found their device easy to use and 83% of those choosing the plug-in device without GPS found their device easy to use (Figure 9-8). At the conclusion of the pilot, 88% of participants expressed overall satisfaction with the pilot (see Figure 9-9).

Figure 9-8 2020-2021 State Passenger Vehicle Pilot Participant Views of Device Ease

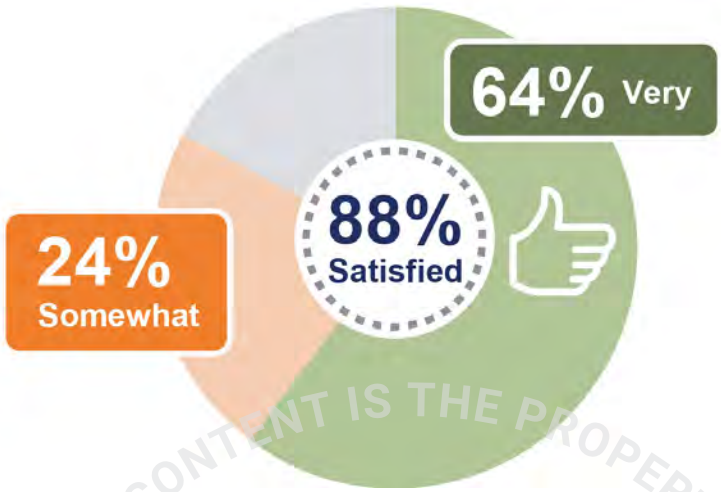

Figure 9-9 2020-2021 State Passenger Vehicle Pilot Participants' Overall Pilot Satisfaction

9.3.2 Creating Synergies with Tolling and Congestion Mitigation

For passenger vehicle drivers using a plug-in device with GPS mileage reporting option, there are opportunities for synergies between tolling, congestion management, and MBUF collection.

The tolling analysis discussed in Section 7 found that MBUF GPS technology can accurately calculate tolls and MBUF at bi-directional toll plazas that have at least 8 feet of distance between the adjacent directional plazas. This analysis also found that MBUF technology has the best tolling accuracy when charged in a cumulative manner as the vehicle passes through multiple plazas along a route. However, there are important limitations to integrating tolling and MBUF technology, and therefore, MBUF is unlikely to fully replace toll tags and plaza infrastructure.

Similarly, as discussed in Section 8, initial study revealed MBUF technology could be used for congestion mitigation. However, more work needs to be done to address issues such as how to implement cordon pricing for drivers who do not choose GPS; the impacts and potential errors encountered with a congestion mitigation zone more complex than a simple trapezoid; and the ability of the MBUF system to only charge the TOD amount on selected roadways.

9.4 A Tiered Rate Based on MPG Doesn't Work

The tiered rate analysis performed in the National Truck Pilot and 2020-2021 State Passenger Vehicle Pilot, described in Section 2.2 and Section 4.4, builds on the Coalition's previous work exploring per-mile rate approaches for commercial and passenger vehicles. Under a revenue neutral approach, both commercial and passenger vehicles with the worst fuel economy receive a benefit by paying much less in MBUF than they pay in fuel taxes. Through the tiered rate analysis, the Coalition sought to understand how tiered rates based on fuel economy would affect vehicles with varying fuel efficiency.

The 2020-2021 Coalition MBUF Work found that tiered rates can result in drastically different charges for vehicles with similar MPGs, are difficult to explain, and create winners and losers (see Figure 9-10). These issues are discussed in further detail below.

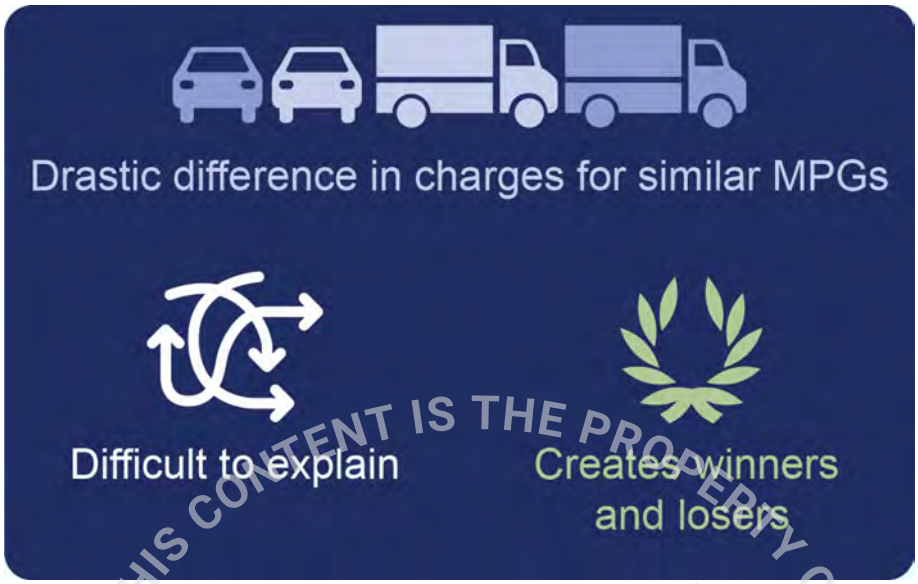

Figure 9-10 Reasons a Tiered Rate Based on MPG Doesn't Work

Drastic Differences for Similar MPGs

The tiered rate analysis showed that MPG-based tiered rates can result in drastically different charges for vehicles with similar MPGs.

As discussed in Section 2.2, the National Truck Pilot used a tiered rate approach on four MPG range categories. The most compelling results regarding the use of MPG categories for rate setting for trucks came during the analysis of Company M, who had an average MPG of 5.50, which was on the top of the 4.0-5.5 MPG range and at the bottom of the 5.5-7.0 MPG range. The analysis shows that depending upon which category Company M is reported in, they either pay 12% less than they would through fuel tax by being in the higher MPG category, or they pay nearly 16% more in the lower MPG category. Table 9-6 shows the results of this comparative analysis.

Table 9-6: National Truck Pilot MPG Range Comparative Analysis

Company M	MPG	Total Miles	Total Fuel Tax	Total MBUF Calculations	Difference
< 5.5 - 7.0 MPG	5.50	380,009	$40,452	$35,571	($4,881)
4.0 - 5.5 MPG	5.50	380,009	$40,452	$46,862	$6,410

The tiered rate analysis in the 2020-2021 State Passenger Vehicle Pilot yielded similar concerns. As discussed in Section 4.4, the pilot utilized a tiered rate structure based on fuel efficiency and was divided into four MPG range categories. The data from the 2020-2021 State Passenger Vehicle Pilot showed that MBUF charges can differ significantly in vehicles with different MPGs within the same category, and in vehicles with similar MPGs but in different categories. For example, two vehicles at different ends of a tiered rate category (e.g., average MPG: 20-29) end up with the same issue as is found with the single rate: the lower MPG vehicle gets a net credit, while the higher MPG vehicle pays additional costs (see Table 9-7).

Additionally, vehicles with a small MPG difference, but in different categories, can pay different net MBUF values. In this scenario, a vehicle with 29 MPG classified as having "average" MPG pays $42 annually while a 31-MPG vehicle with a "high" MPG classification pays just $15. This $27 difference is notable for two vehicles with MPG that are essentially the same.

Table 9-7: Single Rate and Tiered Rate Results (Annual) for Individual Vehicles with Different MPG (North Carolina Passenger Vehicle Example)

MPG	State Fuel Tax Paid	Tiered Rate Classification	Single Revenue Neutral Rate		Tiered Rate	
			Total MBUF	Net MBUF	Total MBUF	Net MBUF
21	$208	Average	$192	($16)	$192	($16)
29	$150	Average	$192	$42	$192	$42
31	$141	High	$192	$51	$156	$15
Annual values based on 12,000 miles per year						

Difficult to Explain

In the early stages of MBUF exploration and implementation, a rate setting solution must be simple and should account for diverse users. However, an MPG-based tiered rate structure may be challenging to communicate to the driving public. Tiered rates involve complex classifications that may be perceived as arbitrary. Communications directors within state DOTs expressed this concern, questioning how certain aspects may be communicated, including the basis for the categories, MPG ranges, and resulting rates.

National Truck Pilot participants and 2020-2021 State Passenger Vehicle Pilot focus group participants also expressed the importance of simplicity to aid in MBUF acceptance. Focus group participants urged caution when it came to utilizing an MBUF system for multiple policy purposes. For this reason, keeping MBUF simple—a flat mileage fee as an alternative to the current fuel tax—at least in its early phases, might be the best way to introduce the concept and to build broad public support. The MCWG used the phrasing, “fair and transparent” as the mantra for MBUF rate setting. Over time, the technology can be flexibly applied to tackle specific needs and to address equity-based concerns as well.

Creates Winners and Losers

In a revenue neutral approach, the most fuel-efficient vehicles are penalized because they end up paying more in MBUF than they currently pay in fuel tax. This creates the unintended penalization of fuel-efficient vehicles, creating a policy paradox for states aiming to increase their fuel-efficient fleets.

The tiered rate approach for the National Truck Pilot rewarded less fuel-efficient fleets and penalized more fuel-efficient fleets. An example shown in Table 9-8 illustrates this point with Company B, who was in the most fuel-efficient tier and Company O, who was in the least fuel-efficient tier. Though Company B had a lower per-mile MBUF than Company O, Company O would pay approximately 11% less than they do currently with a fuel tax model, and Company B would pay about 1% more under MBUF than they do in fuel taxes for the same miles traveled.

Table 9-8: Example Showing Effect of MPG-Based Rates on Trucks

Category	Company B	Company O
Fleet MPG	8.59	4.24
Total IFTA Miles During Pilot	297,642	49,311
Total Fuel Consumed (gal)	34,650	11,630
Total State/Fed tax paid	$22,984	$6,504
Total State/Fed MBUF calculated	$23,226	$5,807
Difference Fuel Tax v MBUF	**$242**	**($697)**

In the 2020-2021 State Passenger Vehicle Pilot, a tiered rate approach achieved the goal of reducing MBUF charges for EVs and other highly fuel-efficient vehicles, while also eliminating the net credit for less fuel-efficient vehicles (i.e., vehicles with an average MPG lower than the value on which the single, revenue neutral rate is based). Moreover, a tiered rate resulted in no change in net MBUF for average MPG vehicles.

While MPG-based tiered rates don't penalize fuel-efficient vehicles, they can potentially create unintended winners and losers. A possible issue with any variable rate structure based on MPG is that charging lower per-mile rates on the more fuel-efficient vehicles could cause lower income households and rural drivers to pay more in MBUF than they do in fuel tax. Similarly, small, independently-owned truck fleets could also be negatively impacted if they are unable to purchase newer and more fuel-efficient trucks. The passenger vehicle and truck pilots both identified significant flaws that must be addressed related to a tiered rate structure based on MPG to avoid penalizing certain vehicles.

9.5 Customized Outreach Needed to Move MBUF Forward

An MBUF approach to transportation funding is still a little-known concept for most of the general public. In statewide public opinion surveys, the Coalition found that 67 – 73% of the public is unfamiliar with the MBUF concept and about two-thirds believe transportation funding is staying the same or increasing. These data point to the need for greater outreach to close knowledge gaps and address potential concerns about MBUF.

As people learn more about MBUF, their support for the concept increases. For example, in statewide public opinion surveys, about half of respondents were in favor of an MBUF approach after they were provided an explanation of the concept, largely because MBUF's pay-for-what-you-use approach is viewed as fairer than the fuel tax. Additionally, MCWG feedback indicates that the trucking industry also responds to messages about fairness to ensure trucks are not singled out to address transportation funding needs, to make sure that commercial and passenger vehicles all pay their fair share.

2019 Passenger Vehicle Pilot work found that designing MBUF outreach around simple messaging that connects to audience values is most effective for closing knowledge gaps. Additionally, strategic outreach and engagement provides an opportunity to address misconceptions and concerns about MBUF, build important connections with policymakers and other stakeholders, and participate in a dialogue with particular user groups. Coalition outreach and engagement efforts during the 2020-2021 Coalition MBUF Work included several presentations, hearings, meetings, media outreach including radios shows and print, and focus group meetings with targeted stakeholders. A selected list is included below.

Legislators and Policymakers

- U.S. Senate Committee on Environment and Public Works.[11]
- Pennsylvania Transportation Revenue Options Commission, which was established in 2021 by Governor Tom Wolf to develop transportation funding recommendations for Pennsylvania.
- Various North Carolina policy bodies (e.g., North Carolina First Commission, which was created to evaluate the state's transportation funding needs and provide recommendations for sustainable funding; the North Carolina General Assembly; and the North Carolina Board of Transportation Funding/Appropriation Strategies Committee).

11 The Senate EPW Hearing was titled: Long-term Solvency of the Highway Trust Fund: Lessons Learned from the Surface Transportation System Funding Alternatives Program and Other User-based Revenue Solutions, and How Funding Uncertainty Affects the Highway Programs.

Industry Organizations and Interest Groups

To engage with stakeholders in key industries, the Coalition conducted presentations and media outreach to discuss Coalition findings as well as the ways MBUF would affect particular users, including EVs and trucks. Efforts included the following:

- The Coalition wrote an article for the Spring 2021 issue of *Tarheel Wheels*, a North Carolina Trucking Association publication
- Executive Director Dr. Patricia Hendren appeared on Road Dog Trucking, a SiriusXM channel exploring topics pertinent to the trucking industry
- Presentations to the following:
  - American Trucking Associations Highway Policy Committee
  - Mileage-Based User Fee Alliance
  - California Road Charge Technical Advisory Committee
  - Drive Electric Pennsylvania Coalition

Transportation Associations and Conferences

Transportation Associations and Conferences offer a unique opportunity to connect with a broad audience of agency stakeholders, subject matter experts, industry groups, researchers, transportation service providers, and other transportation stakeholders. The Coalition used presentations at these events to emphasize the need for sustainable transportation funding, share key Coalition findings, and discuss the ways MBUF would affect passenger vehicles, trucks, and residents in different geographies. Efforts included the following:

- Institute of Transportation Engineers
- American Association of State Highway and Transportation Officials – Committee on Transportation System Operations
- North Carolina Highway 17/64 Association
- International Road Federation
- Penn State Safety Conference
- New York Goods Movement
- California Technical Advisory Committee
- Federal Highway Administration (FHWA) Division Administrators - North
- FHWA Eastern Divisions
- FHWA National MBUF Workshop
- Road User Charging Americas Conference
- Bipartisan Policy Center Event
- National Cooperative Highway Research Program presentation to MPO Leaders
- Southern District of the Institute of Transportation Engineers
- The International Bridge, Tunnel and Turnpike Association - Finance Summit
- Federation of Tax Administrators: Northeast Regional Meeting
- Metropolitan Area Planning Forum
- Southern Motor Fuel Federal Tax Administrators

General Public and Pilot Participants

The Coalition used several forms of online communication to connect with the general public and pilot participants about MBUF. These are discussed in greater detail below.

MBUF Website

The Coalition's MBUF website, www.tetcoalitionmbuf.org, serves as a resource for the general public and pilot participants to learn more about MBUF and transportation funding and how MBUF would affect them. During passenger vehicle and truck pilot activities from August 2020 through March 2021, the Coalition's website saw 12,278 page views, with the greatest traffic occurring during recruitment and enrollment periods. Website efforts included the following:

- Updating the Frequently Asked Questions feature to reflect common questions and concerns expressed in previous pilot efforts, resulting in approximately 1,300 page views
- Updating the MBUF Calculator to add ability to calculate MBUF for EVs
- Updating the Findings page to include:
  - The 2018-2019 Multi-state Truck Pilot Report and Fact Sheet
  - The 2019 Passenger Vehicle Pilot Report and Fact Sheet
  - A March 2021 Fact Sheet with findings from the Coalition's passenger vehicle and motor carrier work
- Added a Newsroom page to communicate Coalition findings and activities in a brief, easy-to-understand manner, resulting in more than 1,700 page views

Monthly Statements

Monthly statements are a powerful tool for helping the public understand what they pay for transportation. Coalition pilot statements include a summary of driving data for the month, including estimated fuel costs, as well as a comparison between estimated state and federal fuel taxes paid and what would be paid with an MBUF system.

For the 2019 pilot, the monthly pilot statement was reconfigured from the 2018 pilot to be used as an additional education tool, providing participants a broader picture of the cost of driving. In the 2020-2021 pilot, the statement was further expanded to include additional information and clarity based on feedback received from participants in the 2019 pilot. The major changes are detailed in Table 9-9 below.

Table 9-9: Changes to 2020-2021 Pilot Participant Monthly Statements

2020-2021 State Passenger Vehicle Pilot	National Truck Pilot
• Addition of a "Daily Activity Log" page summarizing daily trip-level information including mileage data, fuel taxes, and MBUF by trip • Addition of a "Trends" page with a chart summarizing a participants monthly miles driven and fuel consumption compared to the average pilot participant • Addition of an "Understanding Your Statement" page, which includes information about transportation funding, definitions of terms used in the statement, MBUF and fuel tax rates, and an explanation on how MBUF and fuel tax credits are calculated	• Design & usability enhancements • Statement frequency – monthly • Addition of federal fuel tax and related information • Addition of an "Understanding Your Statement" section for educational purposes • Transportation funding 101 • Detailed information about Fleet information • MBUF Rates and Calculation Explanation

The 2020-2021 State Passenger Vehicle Pilot focus group participants felt the statements were helpful and accurate. Several suggested the statement might also serve as an opportunity to educate the public about state and federal transportation funding.

Monthly Newsletters

The Coalition utilized monthly newsletters to connect with 2020-2021 State Passenger Vehicle Pilot participants (sample newsletter provided in Appendix D). Sent via email separately from the monthly statements, these newsletters served to inform participants about pilot activities, value-added features, and Coalition activities and research findings pertinent to their state. The Coalition leveraged data collected through the statewide public opinion surveys, urban-rural analysis, and Passenger Vehicle Pilot participant surveys to develop useful content for the pilot newsletters. Open rates for newsletters ranged from 43% to 48% during the October to January pilot, well above the industry average, which is about 20% according to MailChimp.


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THE EASTERN TRANSPORTATION COALITION

10 Looking Ahead

The Coalition's work has shown that MBUF can be a viable transportation funding solution. With the use of real-world data, the 2020-2021 MBUF Work continued to bring key insights to the national discussion and exploration of MBUF. On the passenger side, this work built on the Coalition's previous studies in Delaware and Pennsylvania by including stakeholders as well as populations and geographies underrepresented in previous pilots. Additionally, passenger work included the addition of two states, North Carolina and New Jersey, providing a clearer picture of how MBUF would affect drivers in Eastern states. On the truck side, the 2020-2021 work provided a better understanding of how MBUF would affect carriers nationally and also highlighted important concerns about rate setting and the need for simplicity, uniformity, enforcement, and compliance. Taken together, the work performed during the 2020-2021 State Passenger Vehicle Pilot, the 2021 Tolling Entity-Led Pilot, and the National Truck Pilot shows that:

- MBUF restores the connection between how much drivers use the roads and how much they pay for them; because of this, rural drivers may actually fare better with MBUF
- Concerns about privacy lessen with driver experience and robust data protections
- Technology can be leveraged to mitigate driver concerns about MBUF and to create solutions for transportation initiatives
- A transparent approach to rate setting is important, and a tiered rate based on MPG doesn't work
- MBUF concerns can be addressed through customized outreach that is tailored to specific audiences

To figure out a clear path forward, it will be necessary to identify what is needed to implement MBUF at the state and multi-state level. This work will continue testing how MBUF affects actual drivers across a variety of real-world environments. A successful MBUF implementation strategy must address public education, privacy concerns, the effect on different places and socioeconomic groups, the unique complexities of the trucking industry, and compliance and enforcement.

The next phase of the Coalition's MBUF work in 2021-2022 will focus on providing more geographic expansion, functional enhancements, and a greater focus on solutions and implementation considerations. This effort includes the expansion of both the passenger vehicle pilots and truck pilot and will help answer some of the questions that remain about MBUF's impact on equity, driver classes, and households. Figure 10-1 provides an overview of the work to be completed in the Coalition's 2021-2022 MBUF Work.

Figure 10-1: Overview of the Coalition's Phase 4 MBUF Work

Appendix A: Pilot Participant Statements

Appendix A.1: National Truck Pilot Statement Example

National Truck MBUF Pilot Statement
December 2020

Company U

Fleet Information

Average Fleet MPG	# of Trucks	# States Traveled
6	10	47

Summary*

Total Miles Driven	138,749
IFTA Exempt Miles	53
Mileage Based User Fee (MBUF) Miles	138,696
Gallons of Fuel Used	23,125

Estimated Costs**

Transportation Costs	Costs you currently pay	Costs with MBUF
Fuel Costs	$45,087.85	$45,087.85
State Fuel Tax	$8,330.46	$0.00
Federal Fuel Tax	$5,642.46	$0.00
Mileage-Based User Fee (State)	$0.00	$7,997.60
Mileage-Based User Fee (Federal)	$0.00	$5,411.21
Total Cost	$59,060.77	$58,496.66
With an MBUF You Would Pay (Net Difference)	($564.11)	

* MBUF miles driven are charged a mileage based user fee (per mile rate) for the purpose of this pilot.
** Transportation costs are estimated. Details are provided in 'Understanding Your Statement' section.
Please note: All charges on this statement are simulated. No amount of monetary value will be exchanged.

Disclaimer: The Eastern Transportation Coalition members and EROAD want to promote a better understanding of why investing in transportation is important, and why the current fuel tax does not provide a long-term and equitable solution in this regard. The Coalition, representing transportation agencies along the entire Eastern Seaboard, and EROAD believes exploring the feasibility of a MBUF solution is important; for now, however, the Coalition and EROAD are neutral whether or not MBUF is the ultimate solution.

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STATE SUMMARY

	Miles Driven		Estimated Fuel Tax		MBUF State Rates	
Jurisdiction	**Total**	**Total MBUF**	**$ / gal**	**$**	**$ / mile**	**$**
Alabama	2,607	2,607	0.2500	108.62	0.0400	104.28
Arizona	4,714	4,714	0.2600	204.27	0.0416	196.10
Arkansas	1,886	1,886	0.2850	89.58	0.0456	86.00
California	3,645	3,645	0.7950	482.96	0.1272	463.64
Colorado	1,974	1,974	0.2050	67.44	0.0328	64.75
Connecticut	462	462	0.4650	35.80	0.0744	34.37
Delaware	74	74	0.2200	2.71	0.0352	2.60
District Of Columbia	8	8	0.2350	0.31	0.0376	0.30
Florida	2,353	2,353	0.3527	138.32	0.0564	132.71
Georgia	4,621	4,621	0.3130	241.06	0.0501	231.51
Idaho	1,919	1,919	0.3200	102.35	0.0512	98.25
Illinois	7,714	7,714	0.6110	785.54	0.0978	754.43
Indiana	7,140	7,140	0.5100	606.90	0.0816	582.62
Iowa	6,204	6,204	0.3250	336.05	0.0520	322.61
Kansas	2,335	2,331	0.2600	101.01	0.0416	96.97
Kentucky	4,340	4,340	0.3180	230.02	0.0509	220.91
Louisiana	1,695	1,695	0.2000	56.50	0.0320	54.24
Maryland	525	525	0.3705	32.42	0.0593	31.13
Massachusetts	136	115	0.2400	4.60	0.0384	4.42
Michigan	619	619	0.3790	39.10	0.0606	37.51
Minnesota	2,752	2,752	0.2850	130.72	0.0456	125.49
Mississippi	1,803	1,803	0.1800	54.09	0.0288	51.93
Missouri	3,400	3,400	0.1700	96.33	0.0272	92.48
Montana	2,891	2,890	0.2945	141.85	0.0471	136.12
Nebraska	6,400	6,400	0.3320	354.13	0.0531	339.84
Nevada	1,078	1,078	0.2700	48.51	0.0432	46.57
New Jersey	990	990	0.4850	80.02	0.0776	76.82
New Mexico	4,192	4,192	0.2100	146.72	0.0336	140.85
New York	3,227	3,227	0.3925	211.10	0.0628	202.66
North Carolina	1,828	1,828	0.3610	109.98	0.0578	105.66
North Dakota	1,428	1,428	0.2300	54.74	0.0368	52.55

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	Miles Driven		Estimated Fuel Tax		MBUF State Rates	
Jurisdiction	**Total**	**Total MBUF**	**$ / gal**	**$**	**$ / mile**	**$**
Ohio	9,730	9,713	0.4700	760.85	0.0752	730.42
Oklahoma	2,500	2,500	0.1900	79.17	0.0304	76.00
Oregon	1,287	1,287	0.0000	0.00	0.0000	0.00
Pennsylvania	6,863	6,863	0.7410	847.58	0.1186	813.95
Rhode Island	64	64	0.3400	3.63	0.0544	3.48
South Carolina	1,783	1,783	0.2400	71.32	0.0384	68.47
South Dakota	422	422	0.2800	19.69	0.0448	18.91
Tennessee	7,556	7,556	0.2700	340.02	0.0432	326.42
Texas	8,396	8,396	0.2000	279.87	0.0320	268.67
Utah	2,219	2,217	0.3110	114.91	0.0498	110.41
Vermont	74	74	0.3100	3.82	0.0496	3.67
Virginia	4,028	4,028	0.3390	227.58	0.0542	218.32
Washington	1,885	1,881	0.4940	154.87	0.0790	148.60
West Virginia	1,137	1,137	0.3570	67.65	0.0571	64.92
Wisconsin	2,167	2,165	0.3290	118.71	0.0526	113.88
Wyoming	3,678	3,676	0.2400	147.04	0.0384	141.16
Total	**138,749**	138,696		**8,330.46**		**7,997.60**

FEDERAL SUMMARY

Distance	Federal Fuel Tax		MBUF Federal Rates	
Total Miles Driven	**$ / gallon**	**$**	**$ / mile**	**$**
138,749	0.2440	5,642.46	0.0390	5,411.21

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UNDERSTANDING YOUR STATEMENT

Transportation Funding 101

Americans pay for transportation infrastructure - such as roads and bridges - primarily through state and federal taxes on fuel each time they fill their tanks. As fuel efficiency increases and more electric vehicles are on the road, motorists contribute less in fuel taxes for every mile driven. That dynamic, coupled with an expected increase in miles driven, inflation, and rising costs to build and maintain roads, has led to a growing shortfall in transportation funding.

Having less money to maintain and manage roadways means the transportation system will continue to worsen each year, which has a significant impact on the trucking industry. Recognizing the fuel tax is not a viable, long-term sustainable funding source, policymakers at the federal and state levels are exploring a mileage-based user fee (MBUF) - a pay for what you use approach - as a potential replacement of the fuel tax.

The aim of this project is to ensure that the unique perspective of the trucking industry is included in the national debate about potential MBUF solutions, acknowledging that motor carriers are major users and funders of the transportation system.

Your participation, the diversity of the pilot fleet, and the national reach of the project will provide key insights into the impact that a MBUF system would have on the trucking sector and provide meaningful information to policymakers.

We value your opinion and are available for questions. Please contact us via TETC_pilot@eroad.com if you have any comments or suggestions.

Fleet Information:

Average Fleet MPG– Your average fleet MPG is derived from the IFTA information you have provided as part of the sign-up information.

Summary:

Total Miles Driven– Total miles recorded for your participating vehicles. This total is also used for the calculation of the Federal MBUF as IFTA exemptions do not apply to federal fuel tax charges.

IFTA Exempt Miles– IFTA exemption rules per state, can be found at: https://www.iftach.org/exempt/view/fuel2020n.php

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Mileage-Based User Fee (MBUF) Miles– Difference between total miles driven and the IFTA exempt miles.

Gallons of Fuel Used– Total miles driven divided by your average fleet MPG, equals the estimated gallons of fuel used by your fleet.

Estimated Costs:

Fuel Costs- Estimated gallons of diesel used multiplied by the average U.S. diesel price. The fuel cost does not include state and federal fuel taxes. Average nationwide diesel prices are obtained from AAA at the end of each reporting period (https:/gasprices.aaa.com/).

State Fuel Tax– Miles traveled by state divided by the average fleet MPG and multiplied by IFTA fuel tax rate (including surcharges) for the state in which the miles were traveled. The only exception is the District of Columbia, which is not a member of IFTA. For D.C. the diesel tax, charged at the pump of 23.5 cents/gallon is being used. The total State Fuel Tax shown is a summation across all states your participating vehicles traveled through, details can be found in the State Summary Section on page 2 of your statement.

Note: In Oregon the IFTA fuel tax rate is $0 due to the state's Weight Mileage Tax. We understand this does not represent your full operational costs. As part of this project we will be highlighting the holistic view of transportation charges to ensure that policy makers are aware of all the transportation fees and taxes you are subject to, including weight distance and other taxes such as tolls and the Heavy Vehicle Use Tax (HVUT) reported and paid separately.

Federal Fuel Tax- The federal diesel fuel tax is 24.4 cents per gallon. This tax is included in the per gallon price of fuel you see at the pump.

Mileage-Based User Fee (State)– A fee paid for each mile driven. For the purpose of this statement, it is the MBUF miles driven in each state times the per-mile rate for each state. The total MBUF is a summation across all states your participating vehicles traveled through, details can be found in the STATE SUMMARY and MBUF Rates chart sections in your statement.

Mileage-Based User Fee (Federal)– Total miles driven multiplied by the per-mile Federal Fuel Tax rate converted to a "cents per mile" fee based on the average fleet MPG category.

Total Cost– The first column is an estimation of the costs you currently pay at the pump, which includes the estimated fuel costs, state fuel tax and federal fuel tax. The second column is the estimation of costs if an MBUF model was implemented, which includes the estimated fuel costs, the MBUF state fees and the MBUF federal fees.

Net Difference– This difference compares the costs you currently pay with the estimated costs of an MBUF. If the difference is in (brackets) it is the amount you would be refunded under an MBUF model. If it is not in brackets, the difference is the amount you would owe under an MBUF model.

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THE EASTERN TRANSPORTATION COALITION
MBUF STUDY

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MBUF Rates and Calculation Explanation

MBUF rates– MBUF rates for each state are calculated based on the IFTA fuel tax rate per state and four MPG categories: 0-4MPG, 4-5.5 MPG, 5.5- 7MPG and 7-10MPG. The MGP category used for your statement is based on your average fleet MPG as provided during the sign-up process. The calculation is as follows: MBUF rate = IFTA fuel tax rate / average MPG for the applicable category. This is to model a 'revenue neutral' rate based on 4 different MPG categories.

Notable mention: This is just an example of how a MBUF rate could be calculated and throughout this project, work will be done to determine ways rates could be calculated in a fair and transparent manner. We encourage you to contact us at TETC_pilot@eroad.com if you have thoughts on what should be considered.

MBUF RATES

Jurisdiction	Per Mile Rate				IFTA Diesel Tax Rate
	0-4 MPG ($ / mile)	4-5.5 MPG ($ / mile)	5.5-7 MPG ($ / mile)	7-10 MPG ($ / mile)	$ / Gal
Alabama	0.0714	0.0526	0.0400	0.0294	0.2500
Arizona	0.0743	0.0547	0.0416	0.0306	0.2600
Arkansas	0.0814	0.0600	0.0456	0.0335	0.2850
California	0.2271	0.1674	0.1272	0.0935	0.7950
Colorado	0.0586	0.0432	0.0328	0.0241	0.2050
Connecticut	0.1329	0.0979	0.0744	0.0547	0.4650
Delaware	0.0629	0.0463	0.0352	0.0259	0.2200
District Of Columbia	0.0671	0.0495	0.0376	0.0276	0.2350
Florida	0.1008	0.0743	0.0564	0.0415	0.3527
Georgia	0.0894	0.0659	0.0501	0.0368	0.3130
Idaho	0.0914	0.0674	0.0512	0.0376	0.3200
Illinois	0.1746	0.1286	0.0978	0.0719	0.6110
Indiana	0.1457	0.1074	0.0816	0.0600	0.5100
Iowa	0.0929	0.0684	0.0520	0.0382	0.3250
Kansas	0.0743	0.0547	0.0416	0.0306	0.2600
Kentucky	0.0909	0.0669	0.0509	0.0374	0.3180
Louisiana	0.0571	0.0421	0.0320	0.0235	0.2000
Maine	0.0891	0.0657	0.0499	0.0367	0.3120
Maryland	0.1059	0.0780	0.0593	0.0436	0.3705
Massachusetts	0.0686	0.0505	0.0384	0.0282	0.2400

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Jurisdiction	Per Mile Rate				IFTA Diesel Tax Rate
	0-4 MPG ($ / mile)	4-5.5 MPG ($ / mile)	5.5-7 MPG ($ / mile)	7-10 MPG ($ / mile)	$ / Gal
Michigan	0.1083	0.0798	0.0606	0.0446	0.3790
Minnesota	0.0814	0.0600	0.0456	0.0335	0.2850
Mississippi	0.0514	0.0379	0.0288	0.0212	0.1800
Missouri	0.0486	0.0358	0.0272	0.0200	0.1700
Montana	0.0841	0.0620	0.0471	0.0346	0.2945
Nebraska	0.0949	0.0699	0.0531	0.0391	0.3320
Nevada	0.0771	0.0568	0.0432	0.0318	0.2700
New Hampshire	0.0634	0.0467	0.0355	0.0261	0.2220
New Jersey	0.1386	0.1021	0.0776	0.0571	0.4850
New Mexico	0.0600	0.0442	0.0336	0.0247	0.2100
New York	0.1121	0.0826	0.0628	0.0462	0.3925
North Carolina	0.1031	0.0760	0.0578	0.0425	0.3610
North Dakota	0.0657	0.0484	0.0368	0.0271	0.2300
Ohio	0.1343	0.0989	0.0752	0.0553	0.4700
Oklahoma	0.0543	0.0400	0.0304	0.0224	0.1900
Oregon	0.0000	0.0000	0.0000	0.0000	0.0000
Pennsylvania	0.2117	0.1560	0.1186	0.0872	0.7410
Rhode Island	0.0971	0.0716	0.0544	0.0400	0.3400
South Carolina	0.0686	0.0505	0.0384	0.0282	0.2400
South Dakota	0.0800	0.0589	0.0448	0.0329	0.2800
Tennessee	0.0771	0.0568	0.0432	0.0318	0.2700
Texas	0.0571	0.0421	0.0320	0.0235	0.2000
Utah	0.0889	0.0655	0.0498	0.0366	0.3110
Vermont	0.0886	0.0653	0.0496	0.0365	0.3100
Virginia	0.0969	0.0714	0.0542	0.0399	0.3390
Washington	0.1411	0.1040	0.0790	0.0581	0.4940
West Virginia	0.1020	0.0752	0.0571	0.0420	0.3570
Wisconsin	0.0940	0.0693	0.0526	0.0387	0.3290
Wyoming	0.0686	0.0505	0.0384	0.0282	0.2400
Federal	0.0697	0.0514	0.0390	0.0287	0.2440

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Appendix A.2: 2020-2021 State Passenger Vehicle Pilot Statement Example

azuga®

2570 N. 1st Street
San Jose, CA 95131

Statement Period: Sep 01 - 30, 2020
Account Number: Azuga-XX

Questions? Email: I95mbufsupport@azuga.com
Phone: 1-(888) 884-7004

Hello, here's your statement for this month. Additional information on the terms used herein and the various rates for each state is provided below in "Understanding Your Statement".

Vehicle Information

Vehicle	VIN	Vehicle Registration State	Mileage Reporting Option
2017 Volvo S60	XXXXXXXXXXXXXXXXX	Virginia	Plug-in device with GPS

Summary	
Total Miles Driven	1036.5
Mileage-Based User Fee (MBUF) Miles[1]	1036.5
Gallons of Fuel Used	32.12

Transportation Costs[2]	Costs You Currently Pay	Costs with an MBUF
Fuel Costs	$ 66.91	$ 66.91
Mileage-Based User Fee (MBUF)	$ 0.00	$ 10.67
State Fuel Tax	$ 7.49	$ 0.00
Federal Fuel Tax	$ 5.91	$ 5.91
Total Cost	$ 80.31	$ 83.49
With an MBUF You Would Pay (Net Difference)	$ 3.18	

[1]Miles driven within the Coalition states are charged a mileage-based user fee (per-mile-rate) for purposes of this pilot.

[2]All costs are estimated. Details are provided in the Understanding Your Statement section.

Please note that all charges on this statement are simulated. No amount of monetary value will be exchanged.

azuga

Statement Period Sep 01 - 30, 2020 | **Account #** Azuga-XX

Mileage–Based User Fee Details

2017 Volvo S60 XXXXXXXXXXXXXXXXX

State: MD

Miles Driven	91.2	**MBUF Charged**	$ 1.47
Fuel Used (Gallons)	2.60	**State Fuel Tax Credit**	$ -0.95
		Net Difference	$ 0.52

State: VA

Miles Driven	681.0	**MBUF Charged**	$ 6.56
Fuel Used (Gallons)	21.62	**State Fuel Tax Credit**	$ -4.73
		Net Difference	$ 1.83

State: DE

Miles Driven	264.3	**MBUF Charged**	$ 2.64
Fuel Used (Gallons)	7.90	**State Fuel Tax Credit**	$ -1.81
		Net Difference	$ 0.83

Mileage Reporting Option: Plug-in device with GPS

azuga

Statement period Sep 01 - 30, 2020 **| Account #** Azuga-XX

Daily Activity Log

2017 Volvo S60 XXXXXXXXXXXXXXXXXX

Date	State	MBUF Miles	Total Miles	Fuel Usage (Gallons)	Mileage Fees	Fuel Tax Credit	MBUF
Sep 1	VA	243.0	243.0	7.33	2.32	$-1.61	$0.71
Sep 2	VA	42.9	42.9	1.19	0.40	$-0.26	$0.14
Sep 3	VA	8.8	8.8	0.42	0.10	$-0.09	$0.01
Sep 4	VA	1.8	1.8	0.10	0.02	$-0.02	$0.00
Sep 5	VA	26.9	26.9	0.93	0.27	$-0.21	$0.06
Sep 6	VA	1.9	1.9	0.09	0.02	$-0.02	$0.00
Sep 7	VA	6.5	6.5	0.27	0.07	$-0.05	$0.02
Sep 8	VA	5.9	5.9	0.27	0.06	$-0.06	$0.00
Sep 9	VA	42.9	42.9	1.33	0.40	$-0.30	$0.10
Sep 11	VA	3.6	3.6	0.18	0.03	$-0.04	$-0.01
Sep 12	VA	2.0	2.0	0.10	0.02	$-0.02	$0.00
Sep 13	VA	5.5	5.5	0.26	0.06	$-0.06	$0.00

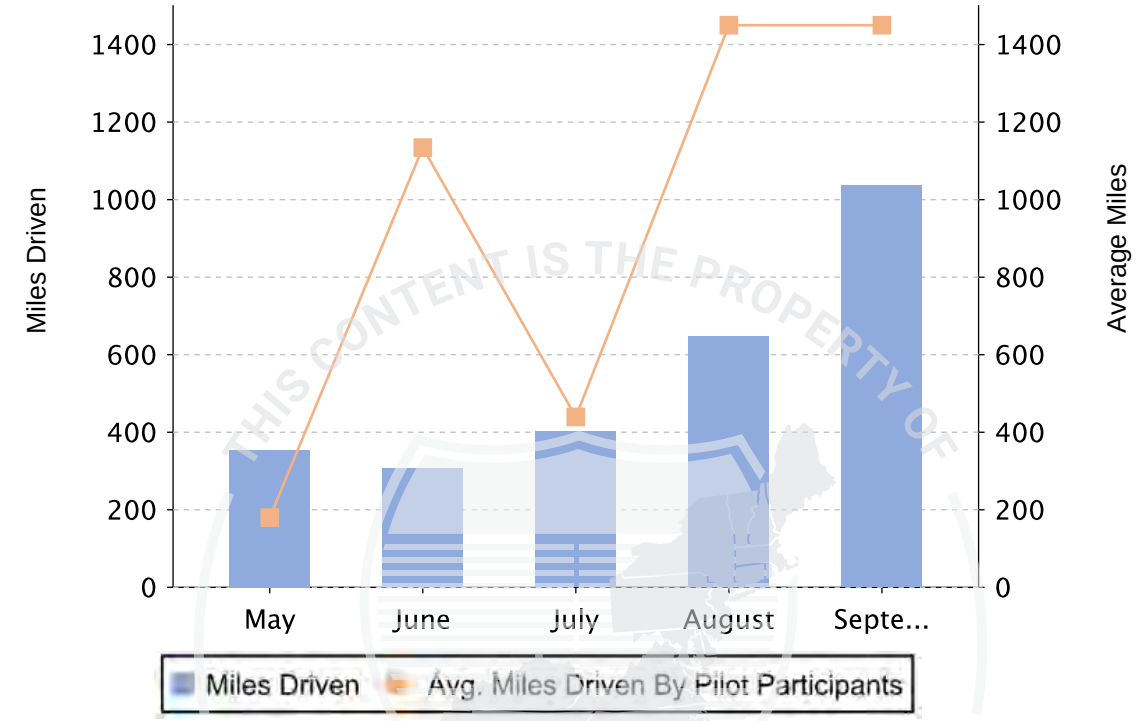
Mileage Reporting Option: Plug-in device with GPS

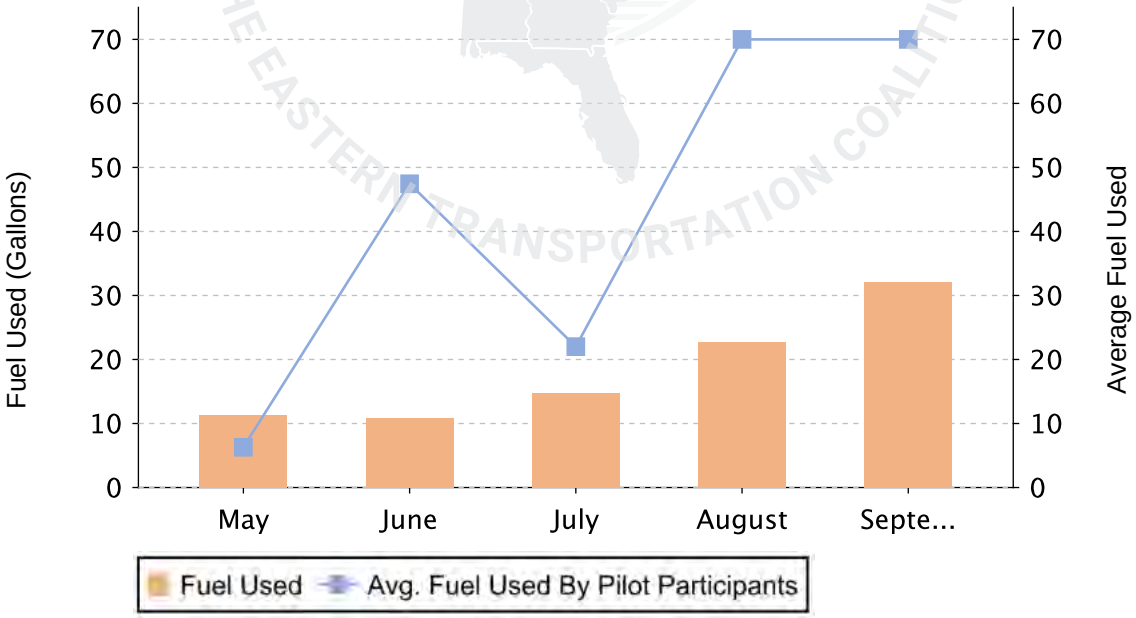
Sep 14	VA	5.4	5.4	0.21	0.06	$-0.04	$0.02
Sep 16	VA	12.0	12.0	0.53	0.12	$-0.12	$0.00
Sep 17	VA	2.0	2.0	0.10	0.02	$-0.02	$0.00
Sep 18	VA	3.9	3.9	0.21	0.04	$-0.04	$0.00
Sep 23	VA	3.4	3.4	0.16	0.04	$-0.04	$0.00
Sep 25	VA	127.9	127.9	3.72	1.22	$-0.81	$0.41
Sep 26	VA	5.9	5.9	0.29	0.05	$-0.06	$-0.01
Sep 27	VA	2.0	2.0	0.09	0.02	$-0.02	$0.00
Sep 28	VA	5.5	5.5	0.23	0.06	$-0.05	$0.01
Sep 29	VA	3.9	3.9	0.19	0.04	$-0.04	$0.00
Sep 30	VA	117.4	117.4	3.42	1.12	$-0.75	$0.37
Sep 30	MD	91.2	91.2	2.60	1.47	$-0.95	$0.52
Sep 30	DE	264.3	264.3	7.90	2.64	$-1.81	$0.83

Mileage Reporting Option: Plug-in device with GPS

Trends

Participant Miles Driven and Fuel Usage Compared to the Average Pilot Participant





Understanding Your Statement

Transportation Funding 101

Americans pay for transportation infrastructure - such as roads and bridges - primarily through a tax on fuel each time they fill their tanks. As fuel efficiency increases and more electric vehicles are on the road, the amount motorists pay to use our transportation system becomes more linked to the amount of fuel purchased versus the number of miles they drive.

The resulting problem is that the cost to build, maintain and operate our roads and bridges is increasing, while funding for these needed investments is decreasing. A mileage-based user fee (MBUF) - a pay for what you use approach - is being explored as a potential alternative to the fuel tax. Your participation in this pilot will help policymakers understand how an MBUF could work and what challenges need to be addressed.

Definitions

Coalition Region - Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Delaware, Maryland, District of Columbia, Virginia, North Carolina, South Carolina, Tennessee, Alabama, Georgia and Florida.

Federal Fuel Tax - The federal fuel tax is 18.4 cents per gallon. This tax is included in the per gallon price of fuel you see at the pump.

Fuel Cost - The estimated cost of the fuel purchased, not including the state and federal fuel taxes paid, at the pump. It is based on the estimated number of gallons used times the average mid-month fuel price in each state where mileage was accrued during the month. Average statewide fuel prices are obtained from AAA (https:/gasprices.aaa.com/).

Gallons of Fuel Used – Fuel consumed by the vehicle for MBUF miles only. This may be collected by the vehicle computer or estimated using the EPA combined rating (e.g., diesel vehicles, hybrids).

Mileage-Based User Fee (MBUF) – A fee paid for each mile driven. For the purpose of this statement, it is the number of miles driven in each state times the per-mile rate for each state. The total MBUF is a summation across all states where you drove. Per mile rates are provided in the tables below.

Net Difference - The state-specific MBUF rates were based on the gas tax in each state and an average 23 MPG. These initial "revenue neutral" are such that a car getting 23 MPG will pay the same amount in MBUF as in state gas tax -- a net difference of 0. A car that gets more than 23 pays more MBUF than gas tax; a car that gets less than 23 MPG pays less MBUF than gas tax resulting in a negative net difference.

Per Mile MBUF Rates and Gas Taxes by State

State Where Mileage Driven	Per Mile Rate (cents per mile)	Gas Tax (cents per gallon)
Alabama	1.18	27.21
Connecticut	1.74	40.13
Delaware	1.00	23.00
District of Columbia	1.02	23.50
Florida	1.85	42.49
Georgia	1.50	34.47
Maine	1.30	30.01
Maryland	1.60	36.70
Massachusetts	1.15	26.54
New Hampshire	1.04	23.83
New Jersey	1.80	41.40
New York	1.96	45.03
North Carolina	1.60	36.35
Pennsylvania	2.55	58.70
Rhode Island	1.52	35.00
South Carolina	0.99	22.75
Tennessee	1.19	27.40
Vermont	1.34	30.81
Virginia	0.95	21.95

MBUF Rates and Calculation Explanation :

The gas tax values shown in the table are based on information provided by the American Petroleum Institute (API), effective January 1, 2020. For some states, these gas tax values represent a weighted statewide average, given that the actual gas tax paid may depend on where the fuel is purchased in some states – for example, some states allow counties and / or regions to add local option taxes (e.g., additional cents per gallon or a percent of the fuel price) to the statewide gas tax.

The per-mile rates for each state are based on the concept of “revenue neutral” – that is, a vehicle getting the national average of 23 MPG[1] would pay a MBUF that is equal to the amount paid for the state gas tax. As an example calculation of this revenue neutral rate, a New Jersey vehicle averaging 23 MPG and driving 1,000 miles (all in New Jersey) will use 1,000 miles / 23 MPG = 43.48 gallons of gas, paying 43.48 gallons × 41.40 cents per gallon = $ 18.00 in New Jersey state gas tax. This equates to $18.00 / 1,000 miles = 1.80 cents per mile.

Using a device with location results in your mileage being differentiated by the Coalition state where the mileage was accrued, and the MBUF rate and gas tax credit based on the mileage driven in each state.

[1]The value used for North Carolina is 22.7 MPG based on NC-specific data.

Appendix B: Pilot Rates

Appendix B.1: National Truck Pilot

For the National Truck Pilot, MBUF rates for each state were calculated based on the IFTA fuel tax rate per state and four MPG categories. The MPG category is based on the average fleet MPG. The calculation is as follows:

MBUF rate = IFTA fuel tax rate / average MPG for the applicable category

This is to model a revenue neutral rate based on the four MPG categories. Table B-1 details the federal and state MBUF rates used in the National Truck Pilot.

Table B-1: National Truck Pilot Rates

Jurisdiction	Per Mile Rate				IFTA Diesel Tax Rate
	0-4 MPG ($ / mile)	4 – 5.5 MPG ($ / mile)	5.5 - 7 MPG ($ / mile)	7 – 10 MPG ($ / mile)	$/ Gal
Alabama	0.0714	0.0526	0.0400	0.0294	0.2500
Arizona	0.0743	0.0547	0.0416	0.0306	0.2600
Arkansas	0.0814	0.0600	0.0456	0.0335	0.2850
California	0.2271	0.1674	0.1272	0.0935	0.7950
Colorado	0.0586	0.0432	0.0328	0.0241	0.2050
Connecticut	0.1329	0.0979	0.0744	0.0547	0.4650
Delaware	0.0629	0.0463	0.0352	0.0259	0.2200
Washington, D.C.	0.0671	0.0495	0.0376	0.0276	0.2350
Florida	0.1008	0.0743	0.0564	0.0415	0.3527
Georgia	0.0894	0.0659	0.0501	0.0368	0.3130
Idaho	0.0914	0.0674	0.0512	0.0376	0.3200
Illinois	0.1746	0.1286	0.0978	0.0719	0.6110
Indiana	0.1457	0.1074	0.0816	0.0600	0.5100
Iowa	0.0929	0.0684	0.0520	0.0382	0.3250

Jurisdiction	Per Mile Rate				IFTA Diesel Tax Rate
	0-4 MPG ($ / mile)	4 – 5.5 MPG ($ / mile)	5.5 - 7 MPG ($ / mile)	7 – 10 MPG ($ / mile)	$/ Gal
Kansas	0.0743	0.0547	0.0416	0.0306	0.2600
Kentucky	0.0909	0.0669	0.0509	0.0374	0.3180
Louisiana	0.0571	0.0421	0.0320	0.0235	0.2000
Maine	0.0891	0.0657	0.0499	0.0367	0.3120
Maryland	0.1059	0.0780	0.0593	0.0436	0.3705
Massachusetts	0.0686	0.0505	0.0384	0.0282	0.2400
Michigan	0.1083	0.0798	0.0606	0.0446	0.3790
Minnesota	0.0814	0.0600	0.0456	0.0335	0.2850
Mississippi	0.0514	0.0379	0.0288	0.0212	0.1800
Missouri	0.0486	0.0358	0.0272	0.0200	0.1700
Montana	0.0841	0.0620	0.0471	0.0346	0.2945
Nebraska	0.0949	0.0699	0.0531	0.0391	0.3320
Nevada	0.0771	0.0568	0.0432	0.0318	0.2700
New Hampshire	0.0634	0.0467	0.0355	0.0261	0.2220
New Jersey	0.1386	0.1021	0.0776	0.0571	0.4850
New Mexico	0.0600	0.0442	0.0336	0.0247	0.2100
New York	0.1121	0.0826	0.0628	0.0462	0.3925
North Carolina	0.1031	0.0760	0.0578	0.0425	0.3610
North Dakota	0.0657	0.0484	0.0368	0.0271	0.2300
Ohio	0.1343	0.0989	0.0752	0.0553	0.4700
Oklahoma	0.0543	0.0400	0.0304	0.0224	0.1900
Oregon	0.0000	0.0000	0.0000	0.0000	0.0000
Pennsylvania	0.2117	0.1560	0.1186	0.0872	0.7410
Rhode Island	0.0971	0.0716	0.0544	0.0400	0.3400

Jurisdiction	Per Mile Rate				IFTA Diesel Tax Rate
	0-4 MPG ($ / mile)	4 – 5.5 MPG ($ / mile)	5.5 - 7 MPG ($ / mile)	7 – 10 MPG ($ / mile)	$/ Gal
South Carolina	0.0686	0.0505	0.0384	0.0282	0.2400
South Dakota	0.0800	0.0589	0.0448	0.0329	0.2800
Tennessee	0.0771	0.0568	0.0432	0.0318	0.2700
Texas	0.0571	0.0421	0.0320	0.0235	0.2000
Utah	0.0889	0.0655	0.0498	0.0366	0.3110
Vermont	0.0886	0.0653	0.0496	0.0365	0.3100
Virginia	0.0969	0.0714	0.0542	0.0399	0.3390
Washington	0.1411	0.1040	0.0790	0.0581	0.4940
West Virginia	0.1020	0.0752	0.0571	0.0420	0.3570
Wisconsin	0.0940	0.0693	0.0526	0.0387	0.3290
Wyoming	0.0686	0.0505	0.0384	0.0282	0.2400
Federal	0.0697	0.0514	0.0390	0.0287	0.2440

Appendix B.2: 2020-2021 State Passenger Vehicle Pilot Rates

The per mile rates and fuel tax credits used for calculating the MBUF for the 2020-2021 State Passenger Vehicle Pilot are based on the concept of "revenue neutral" – that is, a vehicle getting the national average of 23 MPG would pay a MBUF that is equal to the amount paid for the state fuel tax. The per-mile rate calculation is:

Per Mile Rate = State Fuel Tax / National Fuel Economy Average of 23 MPG

The per-mile rates and fuel tax rates were based on information provided by the American Petroleum Institute (API, effective January 1, 2020.

Plug-in Device with GPS: For the Plug-in Device with GPS, mileage collected was differentiated by the Coalition state where the mileage was driven. The net mileage fee was based on each state's per-mile rate, less a credit for the state fuel tax for the estimated gas consumed in each state.

Plug-in Device without GPS: The per-mile rates and state fuel tax rates for the Plug-In Device without GPS are "blended" values that assume a percentage of out of state travel by the residents of each state. For this pilot, a specified percentage of mileage and fuel tax payments were assumed to have occurred in the state where the vehicle is registered. These percentages were derived from census information regarding the percent of residents in each state that work in another state (see Table B-2). The remaining percentage of the vehicle's mileage is assumed to have occurred outside of the state of registration, with an average per-mile fee and average fuel tax for all out-of-state mileage based on the per-mile rates and state fuel taxes in adjacent Coalition states. In the event the blended rates were less than the values for the state of vehicle registration – as is the case for a state where the gas tax is higher than the gas taxes in adjacent states – the values for the state of vehicle registration were used.

Table B-2: Out-of-State Mileage Assumptions for Device without GPS

State	Out of State Mileage by Resident Drivers*	Other State Mileage Distribution
Alabama	5%	GA (40%), FL (30%), TN (30%)
Connecticut	8%	NY (50%), MA (25%), RI (25%)
Delaware	18%	PA (50%), NJ (25%), MD(25%)
District of Columbia	30%	VA, MD
Florida	1%	GA
Georgia	3%	SC, FL, AL, NC
Maine	5%	NH, MA
Maryland	20%	DC (35%), VA(35%), PA(15%), DE(15%)
Massachusetts	5%	CT, NH, RI, NY
New Hampshire	18%	MA (50%) VT (25%), ME (25%)
New Jersey	15%	NY, PA
New York	4%	NJ (40%), CT (40%), MA (15%), PA (15%)
North Carolina	3%	VA (40%), SC (40%), TN (20%)
Pennsylvania	6%	DE, MD, NJ, NY
Rhode Island	16%	CT, MA

State	Out of State Mileage by Resident Drivers*	Other State Mileage Distribution
South Carolina	5%	NC (40%), GA (40%), TN (20%)
Tennessee	5%	NC (35%), GA (35%), AL (30%)
Vermont	8%	NH (50%), NY (25%), MA (25%)
Virginia	10%	MD (40%), DC (40%), NC (20%)

** These percentages were derived from census information regarding the percent of residents in each state that work in another state.*

The per-mile rates and fuel tax rates used in the 2020-2021 State Passenger Vehicle Pilot for both the Plug-in Device with GPS and the Plug-in Device without GPS mileage reporting options are listed in Table A 3below for each of the Coalition partner states.

Table A 3: Per-Mile Rates and Fuel Tax Rates

State	Device with GPS		Device without GPS	
	Per-Mile Rate (cents per mile)	Fuel Tax * (cents per gallon)	Per-Mile Rate** (cents per mile)	Fuel Tax ** (cents per gallon)
Alabama	1.18	27.21	1.20	27.59
Connecticut	1.74	40.13	1.74	40.13
Delaware	1.00	23.00	1.20	27.66
District of Columbia	1.02	23.50	1.10	22.25
Florida	1.85	42.49	1.85	42.49
Georgia	1.50	34.47	1.50	34.47
Maine	1.30	30.01	1.30	30.01
Maryland	1.60	36.70	1.60	36.70
Massachusetts	1.15	26.54	1.17	27.01
New Hampshire	1.04	23.83	1.07	24.67
New Jersey	1.80	41.40	1.87	42.97
New York	1.96	45.03	1.96	45.04
North Carolina***	1.60	36.35	1.60	36.35
Pennsylvania	2.55	58.70	2.55	58.70

State	Device with GPS		Device without GPS	
	Per-Mile Rate (cents per mile)	Fuel Tax * (cents per gallon)	Per-Mile Rate** (cents per mile)	Fuel Tax ** (cents per gallon)
Rhode Island	1.52	35.00	1.52	35.00
South Carolina	0.99	22.75	1.01	23.30
Tennessee	1.19	27.40	1.20	27.68
Vermont	1.34	30.81	1.34	30.81
Virginia	0.95	21.95	1.00	22.89

*Based on information provided by the American Petroleum Institute (API), effective January 1, 2020. For some states, these fuel tax values represent a weighted statewide average, given that the actual fuel tax paid may depend on where the fuel is purchased since some states allow counties and / or regions to add local option taxes to the statewide fuel tax.

** The combined state fuel taxes and per-mile rates in the table are "blended" values that assume a percentage of out of state travel by the residents of each state. The percentage of out of state travel was derived from census information regarding the percent of residents in each state that work in another state.

***North Carolina state average of 22.7 was used in the calculation instead of the national average.

Appendix C: Pilot Participant Agreements

Appendix C.1: National Truck Pilot Participant Agreement

EROAD Pilot Agreement

EROAD details

Name	EROAD
Address	
Contact	
Email	
Phone	

Carrier details

Name	
Address	
Email	
Phone	

Signatures

Signed for EROAD Inc. by its authorised representative:

Name		**Signature**	
Role		**Date**	

Signed by Carrier:

Name		**Signature**	
Role		**Date**	

INTRODUCTION

A. From October 1, 2020 a six-month nationwide truck pilot will commence. The purpose of the pilot is to further explore the feasibility of using existing regulations and technology as a framework for a potential future Mileage-Based User Fee (MBUF) approach and to build a deeper understanding of the motor carrier industry's requirements.

B. EROAD has been selected by the Eastern Transportation Coalition and the Delaware Department of Transportation and in conjunction with CH2M (together referred to as "**Partners**") as a vendor for the Corridor pilot project ("**The Pilot Project**").

C. The EROAD system will automatically record information related to each vehicle participating in the Pilot Project and the miles travelled per state. The EROAD system will generate monthly reports for the Partners and monthly statements. The monthly statement (received via email) will outline the amount of the usage fee (based on miles reported), less any credits for the estimated amount of fuel taxes paid based on the average fleet MPG per the IFTA return. The simulated payment method used during the course of the Pilot Project will be simulated so no actual funds will be transferred.

D. The parties have agreed that the Carrier will participate in the Pilot Project. In consideration for their participation in the Pilot Project, the Carrier will be provided, free of charge, with the right to use EROAD products and services for the duration of the Pilot Project. At the start of the Pilot Project, a dedicated account manager from EROAD will contact the Carrier and be the main point of contact for the Carrier in relation to any matters concerning the Pilot Project.

The parties further agree:

TERM AND TERMINATION

1. This agreement starts on October 1, 2020 and will run until 31 March 2021 ("**Term**"), unless extended by mutual agreement.
2. Either party may terminate this Pilot agreement at any time during the Term by written notice of termination delivered to the other party.

EROAD'S RESPONSIBILITIES

3. During the Term, EROAD grants Carrier a non-exclusive, non-transferable license to use EROAD's web portal (Depot), product features and associated documentation solely for use in connection with the Pilot Project for the duration of the pilot (October 2020 – March 2021).
4. EROAD will install the Electronic-On-Board-Recorder (Ehubo) in each agreed vehicle at a time and place agreed upon by Carrier.
5. EROAD will arrange for the Ehubo to be removed from the vehicle at the end of the Pilot Project or within a reasonable time following cancellation of this Agreement.

6. EROAD will cover the cost of installing, and at the end of the Pilot Project removing, the Ehubo. EROAD will not be responsible for restoring the Carrier's vehicle(s) to its pre-installation condition.
7. EROAD will provide Carrier with set-up, training and user documentation.

DISCLOSURE OF DATA

8. The key Pilot Project objectives are for EROAD to share data with Partners in order to enable Partners to conduct analysis, and reporting, to:
   a. study the feasibility of regulations and technology as a framework for future MBUF approach; and
   b. to ultimately assess feasibility of MBUF as an alternative for transportation funding.
   (collectively referred to as "**the Pilot Project Objectives**")

9. To enable the Pilot Project Objectives, the Carrier grants EROAD the right to disclose the following data to Partners during the Term of this agreement **("Pilot Data"):**
   a. The Carrier's name, address and industry;
   b. Each of the Carrier's vehicle information participating in the pilot, including the registration plate and the vehicle type, configuration and make;
   c. Distance travelled by jurisdiction and road type;
   d. Total monthly distance travelled by jurisdiction by each vehicle;
   e. Total monthly distance travelled by each vehicle overall;
   Any detailed information provided to Partners will be anonymized. Only monthly summaries of distance travelled by vehicle provided to Partners will include vehicle information. EROAD will not share with the Partners any specific location data relating to a particular vehicle of the Carrier.

10. EROAD acknowledges that the Carrier's data is confidential, commercially sensitive and solely owned by the Carrier. Prior to disclosing the Pilot Data to Partners, EROAD will procure an agreement from Partners that any reporting will not disclose any personal information contained within the Pilot Data that can be used to identify, contact or locate an individual.

YOUR RESPONSIBILITIES

Obligations

11. During the Term, you will provide:
   a. the required company vehicle(s) for the purposes of installing the EROAD hardware for the purpose of the Pilot Project;
   b. a copy of a recent IFTA return;
   c. a copy of a recent tolling statements; and
   d. Pilot feedback (by way of short interview or survey).

Responsible behaviour

12. During the Term you will be required by EROAD to:
    a) Use the EROAD products and services in a responsible manner;
    b) Not attempt to copy, modify, adapt, disassemble, decompile, make derivative works of, tamper or interfere with, or change the configuration of, the features and services of the EROAD products and services;
    c) Not breach any intellectual property rights in anything forming part of, or accessed using, the EROAD products and services;
    d) Comply with all laws that may apply to your use of the EROAD products and services;
    e) Not transfer to anyone else any of your rights or responsibilities under any of the terms relating to your participation in the Pilot Project;
    f) Accept that it is a necessary part of the Pilot Project for anyone in EROAD to collect information about your usage of the EROAD products and services.

CONSEQUENCES OF TERMINATION

13. Following termination or expiration of this agreement, the EROAD products and services may be discontinued. Should you wish to continue using the EROAD products and services you may need to agree to a new set of terms and conditions that will govern your use of EROAD products and services at that time.

CONFIDENTIALITY

14. The terms of this Pilot agreement are confidential and may not be disclosed to any third party without EROAD's prior written consent unless it is already publicly available, through no fault of yours ("**Confidential Material**").

15. If you are legally required to disclose any of the Confidential Material, you must advise EROAD of this before disclosing it and you must only disclose that part of the Confidential Material which EROAD's legal advisers reasonably believe is necessary to disclose by law.

EROAD'S RIGHTS AND LIABILITY

18. The Carrier, its officers, directors, agents and employees shall indemnify EROAD from and against any third-party claims against EROAD for losses (including lost data, revenue or profits), liabilities, claims, costs and expenses (including, but not limited to, reasonable attorneys' fees) of any nature whatsoever arising out of or related to this Pilot agreement or the subject thereof.

19. To the fullest extent permitted by law, EROAD shall not be liable to the Carrier for any loss or damage whatsoever which is suffered (including, without limitation, loss of profits, or indirect or consequential loss), or for

personal injury suffered or sustained, as a result of participating in the Pilot Project.

20. Where EROAD is liable to the Carrier and for any reason EROAD cannot rely on the exclusion of liability set out above, the maximum combined amount for which anyone in EROAD will be liable to the Carrier and anyone else who uses the services provided to the Carrier is limited to $1,000 for any event or for any series of related events but not more than a total of $5,000 in any 12 month period.

PRIVACY

21. You agree that anyone in EROAD may collect personal information about you in relation to the Pilot Project or in order to enable your participation in the Pilot Project. You may ask to see information held about you, as long as EROAD can readily retrieve it, and ask for any details that are wrong to be corrected. EROAD and other members of EROAD, including our third party agencies, may also hold the information, share it with each other and with EROAD employees and contractors of EROAD, with Partners and with other service providers participating in or associated with the Pilot Project.

22. EROAD will also produce non-personal data reports that do not reveal the identity, activities or contact details of any specific person. The collected information will be securely stored and only accessible to researchers involved in the Pilot Project. The data used for these purposes will not contain any participant specific information and will only be used at the aggregated level (combined with other participants' data).

23. **Disclosure of Personal Information to Third Parties**. Given a key purpose of the Pilot is to gain understanding of the carrier industry's requirements, you will be asked to participate in interviews and surveys. Another third-party company will be conducting these surveys and reach out to you via email. The third-party company will not have access to the pilot data collected by EROAD and is legally required to adhere to this privacy policy and protect your personal information.

24. We may ask you to participate in future trials. If you agree to participate in future trials, these trials will be governed by separate pilot agreements.

25. All personally identifiable information collected solely for the purposes of the Pilot Project, will be destroyed within 60 days of the completion of the Pilot Project. Non-personal information (i.e. total mileage, vehicle make and model, etc.) may be retained indefinitely and used for other research purposes. All data will be anonymized, securely stored, and only individuals involved in the research study will have access to the data.

GENERAL

23. **Entire agreement:** This Pilot agreement constitutes the entire agreement between the parties in relation its subject matter and supersedes and extinguishes all previous drafts, agreements, arrangements and understandings between them, whether written or oral, relating to its

subject matter. The terms of this agreement may be modified only by written agreement.

24. **Governing Law.** This Pilot agreement is governed by the laws of the State of Oregon and the parties submit to the jurisdiction of the courts of the State of Oregon.

25. **Survival.** Clauses 9,10, 13, 14 15, 16, 17, 18, 19, 20, 21 and 24 will survive termination of the Agreement.

Appendix C.2: 2020-2021 State Passenger Vehicle Pilot Participant Agreement Example

Mileage-Based User Fee Pilot

Policies and Participation Agreement

To ensure the voices of citizens on the east coast are a part of the critical national discussion of how to establish a sustainable and equitable transportation funding approach, The Eastern Transportation Coalition (formerly the I-95 Corridor Coalition) applied for and received funding through the USDOT "Surface Transportation System Funding Alternatives" (STSFA) program to operate a Mileage-Based Usage Fee (MBUF) Pilot. The purpose of the MBUF Pilot is to explore the feasibility of replacing the fuel tax with a MBUF approach in a multi-state environment . We are particularly interested in receiving feedback on the technologies used in the pilot and the other driver amenities provided, reactions to receiving a monthly MBUF statement for road usage, any concerns with privacy and data security, and the fairness of the MBUF system. All MBUF charges and tax credits shown on the monthly statement will be simulated and no actual monies will be received from (or paid to) a participant as part of the MBUF Pilot.

MBUF Pilot Data Collection and Use

To set up and properly manage your MBUF account during the pilot the account manager will collect the following information:

- Your full name and address, including zip code
- Your email address and phone number
- Year, make and model of vehicles you own or lease
- Fuel type of the vehicles you own or lease (gasoline, diesel, electric or combination (hybrid/plug-in hybrid))
- The Vehicle Identification Number (VIN) for the vehicle(s) you will enroll in the Pilot
- The state you reside in
- The state your vehicle is registered in

The account manager is responsible for setting up your MBUF account and processing your mileage reports, delivering mileage reporting devices to persons who choose to test those devices, and providing customer services.

Occasionally, the Coalition or your account manager may use your personal information to contact you or send important notices about your account, changes in the MBUF Pilot, surveys, or changes to these policies.

Location-Based Services are Entirely Optional

Your vehicle location details are not required to participate in the MBUF Pilot. If you do not want location information collected by your account manager, you simply select a mileage reporting option that does not use location-based services during the pilot enrollment. It is important to note that if you choose the non-location technology option, a portion of your total miles will be allocated to neighboring states based on default estimates. In addition, some premium features offered by the account manager will not function without location data. No detailed location information (e.g., routes taken) is provided to the Coalition, the Coalition member states, or any third party by the account manager.

Collection and Use of Non-Personal Information

The account manager will also produce non-personal data reports that do not reveal the identity, activities or contact details of any specific person. The collected information will be securely stored and only accessible to researchers. Below are examples of non-personal information and how it might be used:

- Analysis of mileage by persons living in a certain area, to gain a better understanding of how MBUF might impact drivers differently, depending upon where they live.
- Analysis of difficulties participants have in setting up their MBUF mileage accounts, so that these services can be improved for any future MBUF system.

- Analysis of MBUF by drivers of different makes and models of vehicles, to gain insight into how a MBUF system compares against the gas tax system.

The data used for these purposes will not contain any participant specific information and will only be used at the aggregated level (combined with other participants' data).

Disclosure of Personal Information to Third Parties

Given a key purpose of the pilot is to gather feedback from participants, you will be asked to participate in brief surveys over the course of the pilot. Another third-party company will be conducting these surveys and will reach out to you via email. The third-party survey company will not have access to the pilot data collected by the account manager and is legally required to adhere to this privacy policy and protect your personal information.

Your Right to Inspect Your information and Records

Your account manager will provide you the opportunity to view all of your personal information and data collected and stored as part of the MBUF Pilot to ensure only information and data you have authorized is being collected. To view your information, please contact your account manager using the email address or telephone number provided below.

Email: i95mbufsupport@azuga.com
Telephone (Help Desk): (888) 884-7004

If you notice anything in your account that seems to be a mistake, you may request a review by your account manager, and a prompt correction of any errors discovered will be made.

Retention of Your Information and Records

All personally identifiable information that is collected to set up and manage your mileage account, including mileage and other data collected during the pilot, will be destroyed within 30 days of the completion of the MBUF Pilot. Non-personal information (i.e. total mileage, vehicle make and model, etc.) may be retained indefinitely and used for other MBUF research purposes. All data will be anonymized, securely stored, and only individuals involved in the research study will have access to the data. All individuals that will have access to personally identifiable information as part of this study will sign a non-disclosure agreement to ensure that they do not disclose personally identifiable information.

Participant Resources

The following website contains detailed information about the pilot program, frequently asked questions, a help desk, and contacts for specific information.

Website: www.tetcoalitionMBUF.org
Telephone (Help Desk): (888) 884-7004
Email: i95mbufsupport@azuga.com

The Eastern Transportation Coalition MBUF Pilot falls under the University of Maryland standard research protocols. For more information about these protocols, contact UMD Institutional Review Board at: irb@umd.edu.

Pilot Agreement

Volunteer participants in The Eastern Transportation Coalition MBUF Pilot will evaluate the feasibility of MBUF as a potential replacement of the fuel tax. All MBUF payments and fuel tax credits will be simulated and no actual monies will be paid to a participant - or received from a participant as part of the MBUF Pilot.

Participant Agreement

To participate in The Eastern Transportation Coalition MBUF Pilot, I understand and agree to the following:

1. I agree to participate in the Pilot for the designated period, beginning with the date of signature on this agreement.
2. By enrolling in the Pilot, I agree to set up a MBUF account with the account manager and install a mileage reporting device in my designated vehicle(s). You may also download an app to your Smartphone for the purpose of reviewing your account, trip logs, and other information.
3. Volunteers will be given a choice of several MBUF mileage reporting options. I agree to choose one of the mileage reporting options and provide MBUF Pilot monthly mileage data via the approach appropriate to the reporting option chosen.
4. I agree to return the mileage reporting device upon withdrawal of my vehicle from the pilot, including recording the vehicle\'s odometer reading when the device is removed.
5. I understand that I will receive (via e-mail) a monthly statement outlining the amount of the usage fee (based on miles reported), less any credits for the estimated amount of fuel taxes paid. I further understand that the estimated amounts will be calculated accurately, but as part of the MBUF Pilot are not due and payable.
6. I will report all difficulties or malfunctions in the mileage reporting device or statement errors to my account manager in a timely manner and allow the account manager the opportunity to correct them.
7. I will remove the device and notify the account manager before selling any vehicle enrolled in the MBUF Pilot.
8. I will notify the account manager if I lose the mileage reporting device (such as by theft or accident), so the account manager may arrange for a replacement mileage reporting device.
9. I agree not to tamper with the mileage reporting device or otherwise purposefully attempt to defraud the pilot.
10. I understand that participation in periodic surveys is important to the MBUF Pilot and to provide accurate answers to questions related to my experience as a participant in the MBUF Pilot. I authorize my email address, provided at enrollment to be used by the Coalition or their authorized representatives to disseminate the surveys.

I acknowledge and agree to the conditions provided in the MBUF Pilot Privacy Policy.

MBUF Pilot Agreement:

The MBUF Pilot will provide material to assist the participant with enrollment, account setup, device installation and account closeout, and will assist the participant with any or all of these activities as needed.

The Eastern Transportation Coalition may cancel the MBUF Pilot or the participant\'s involvement in the pilot at any time. Should the participant wish to leave the pilot prior to the conclusion of the pilot, the participant may do so by providing notice to the account manager and returning the mileage reporting device.

Appendix D: 2020-2021 State Passenger Vehicle Pilot Newsletter Example

In this issue:

Why study MBUF in the Eastern US?

Because better roads could depend on it.

You depend on good roads to get you where you want to go. But the system we currently have to fund our roads isn't sustainable. We want to know if MBUF can help - and here are a few reasons we think studying MBUF in the Eastern States is important now more than ever.

1. We need good roads. Even during a pandemic, pilot participants drove an average of 900 miles each in August through October - and 10% of those miles were driven out of state! This shows that even in hard times, we depend on reliable roads and bridges to work, school, health visits, and recreation.

2. Transportation funding is on the decline. The fuel tax was created as a way to help fund transportation infrastructure. But, this system was designed decades ago when cars used more fuel than they do today and the amount of fuel purchased was more in line with the number of miles traveled.

3. Our cars are going farther on less fuel. Fuel-efficient and electric vehicles are becoming more prevalent on East Coast highways. While great for the environment, this creates a financial challenge since energy-efficient and electric vehicles require less gas and generate less fuel tax revenue. In the coming years, Eastern states will need a solution that doesn't place the transportation tax burden solely on owners of older, less fuel-efficient vehicles.

4. Technology is changing the landscape of transportation. By harnessing the power of technology, states can explore alternatives for raising road fund money, and drivers can use their car's computer to learn more about their driving habits, keep track of the health of their vehicle, and even earn some performance badges.

5. Most people don't know how roads are funded. Our surveys have found that most people don't know how transportation is funded, or that funds for transportation are diminishing. Through MBUF studies, participants come to better understand not only transportation funding, but also their own role in maintaining the transportation systems they rely on.

Is MBUF the solution? We're not sure. Studying MBUF through pilots like the one you're participating in is an important step toward finding a solution - and why we're so excited you're involved in this study.

Just the facts: Addressing MBUF myths about rural drivers and the fuel tax.

Myth: Rural drivers will pay more under an MBUF model than they do under the current fuel tax structure.

Fact: If MBUF replaces state fuel taxes paid today, rural drivers will pay less than they do currently.

We (with the help of EBP US) conducted an analysis on the potential implications of an MBUF system on rural and urban households in Pennsylvania. From this work we found:

- **Changes would be minimal for most households.** Our preliminary findings show that if today's state fuel tax was replaced by MBUF, it would change household expenses, on average, $17 a year. In other words, depending on where residents live and what type of vehicle they drive, a shift to MBUF is estimated to change household expenses by $1.50 a month.
- **How far vehicles can drive on a tank of fuel makes a difference.** Households near urban areas tend to have more fuel-efficient vehicles than those in rural areas. This means urban households generally pay less fuel tax per mile driven than rural households in the current fuel tax funding model.
- If the fuel tax were replaced with a revenue neutral MBUF system, **drivers in most rural areas would pay less than they do now.**

PREMIUM FEATURE

SPOTLIGHT

Premium Feature Spotlight:
Know your carbon footprint.

Did you know you can use information obtained from your mileage-recording device to assess how your driving choices impact the amount of greenhouse gas you produce? The greenhouse gas production is called your carbon footprint.

When you opt-in to the Carbon Footprint Premium Feature through your **online account**, you can view the amount of carbon dioxide your car is releasing, see how your footprint changes over time, and compare it to other pilot participants. You can also see how your carbon footprint changes when you choose to walk, bike, reduce idling, or even use cruise control.

Learn more about the premium features on your mileage-recording device on the **Frequently Asked Questions** page on the pilot website.

Helpful Links

- **Access your online account**
- **Frequently Asked Questions**
- **Azuga Help Desk:** For technical support related to your device, contact the Help Desk at I95mbufsupport@azuga.com or 1-888-884-7004.
- **Contact the Coalition:** mbuf@tetcoalition.org
- **Pilot Website:** tetcoalitionmbuf.org

**The I-95 Corridor Coalition is now the Eastern Transportation Coalition.*