Evaluation of the I-95 Corridor Coalition’s Phase 1: Mileage-Based User Fee Study

Executive Summary

September 2019
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Background

Funding for constructing, maintaining, and operating roadways and bridges along the eastern seaboard comes primarily from state and federal fuel taxes that are part of the transaction when purchasing gasoline or diesel fuel at the pump. The purchasing power of pay-at-the-pump fuel tax revenues has been eroding over the past two decades. This is a result of several factors, including: inflation, more fuel-efficient vehicles, and an increase in electric and hybrid vehicles.

The overall impact of these factors means that while the number of miles driven are expected to increase in the United States, fewer gallons of fuel will be sold, with a corresponding decrease in revenues from fuel taxes as illustrated in the graphic to the right. To address this decrease in revenue, new and sustainable methods of funding transportation need to be explored.

To ensure the voices of citizens along the I-95 Corridor are a part of this critical exploration, the I-95 Corridor Coalition, working through the Delaware Department of Transportation (DelDOT) as the lead state, submitted a Surface Transportation System Funding Alternatives grant application in May 2016 and was subsequently awarded a grant to explore the feasibility of replacing the fuel tax with a mileage-based user fee (MBUF) approach in a multi-state environment. The application addressed three major items: education and outreach, analysis of issues associated with an MBUF, and an MBUF-focused regional pilot.

The I-95 Corridor Coalition MBUF Study Overview

The eastern seaboard possesses several unique characteristics that will likely impact any future approach for transportation funding – issues that have not been addressed in other MBUF explorations around the country. The overall vision for the study was to gain an understanding of the foundation necessary for a viable MBUF approach for funding transportation improvements that would enable a smooth transition from the current fuel tax to a more sustainable and user-based funding source. The focus areas of the I-95 Corridor Coalition’s efforts include:

- **Out of State Mileage** – A fundamental shift that an MBUF would create is linking transportation system revenue to the actual use of the roads versus where fuel was purchased. Currently, if a driver purchases a tank of gas in northern Delaware and then proceeds to cross the state line and mainly drive in Pennsylvania, only Delaware will receive gas tax revenue, with Pennsylvania roads accruing most of the mileage. Given the relatively
small geographic size of many states in the mid-Atlantic and northeast regions, cross-state travel and the potential impact on transportation funding, are major issues and concerns for many state DOTs along the I-95 Corridor. To gain a better understanding of how a shift from fuel tax to an MBUF would affect DOT revenue, a regional pilot was conducted with participants from 13 east coast states who traveled up and down the eastern seaboard. Mileage by state was collected to determine the importance of out-of-state travel and interoperability. The study also included a high-level financial analysis comparing projected MBUF revenues when the MBUF is based on the driver’s state of residence and when the MBUF is based on the state in which the miles are driven.

- **Tolling** – The approximately 3,000 miles of toll facilities along the eastern seaboard carry significant amounts of passenger car and commercial vehicle traffic. Therefore, it will be critical to maximize the interoperability and integration of toll roads, bridges, and tunnels with any future MBUF system. The Phase 1 effort started addressing these interoperability and integration issues, including the possibility of using tolling back offices for MBUF transaction processing, and the ability of MBUF technologies to also calculate existing tolls and accurately mimic toll collections.

- **Trucking** – The movement of freight within the I-95 Corridor is of national importance. Much of this truck traffic crosses multiple state lines, serving the numerous ports and distribution centers throughout the eastern seaboard. Although trucks account for 14% of vehicle miles traveled on the national highway system, the trucking industry currently covers approximately 45% of the Highway Trust Fund through the commercial truck diesel and gas tax and other trucking-specific excise taxes. It will therefore be critical to address commercial vehicles and bring the perspective of the trucking industry to the national evaluation of MBUF. The Coalition will conduct a multi-state truck pilot - the first in the nation - in Phase 2. How MBUF for commercial vehicles might be integrated into existing regulations (e.g., International Fuel Tax Agreement) will also be examined.

- **Amenities** – Another consideration in promoting public understanding and acceptance is to potentially “link” MBUF with driver amenities – services that can make owning / leasing and driving a car better. This pilot explored whether value-added amenities offered through MBUF technology could make MBUF more acceptable.

The Coalition is committed to exploring MBUF in a multi-state environment and bringing solutions to the important national discussion about sustainable transportation funding. However, it is important to remember the following.

The I-95 Corridor Coalition and its members 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, believes exploring the feasibility of a MBUF solution is important; for now, however, the Coalition and its partners are neutral if MBUF is the ultimate solution.
The I-95 Corridor Coalition MBUF Study: Phase 1 Purpose

National experience has shown that experiencing a MBUF system first-hand through pilots can help expand public understanding and acceptance of the concept. The Phase 1 pilot was “focused” in that the participants – consisting of senior staff from departments of transportation, members and staff from state legislatures and the U.S. Congress, thought leaders from national organizations, local officials, representatives from the trucking industry, toll authorities, and the media – were actively recruited and invited. In this manner, the Phase 1 pilot itself was an important education and outreach effort.

Phase 1 Characteristics

Participants

The Coalition, DelDOT and the Pennsylvania Department of Transportation were responsible for participant identification and recruitment for the Phase 1 pilot. Participants were recruited from 13 Coalition states and included people from departments of transportation, members and staff from state legislatures and the U.S. Congress, transportation thought leaders, local officials, representatives from the trucking industry, toll authorities, local media and national organizations.

Two hundred and seven people were recruited for the Phase 1 pilot, of which 155 enrolled and participated. The chart to the right shows the breakout of Phase 1 pilot participants by organization category. The “other” category includes residents, transportation consultants, Coalition members and other private companies.

Vehicle Types

The Phase 1 pilot vehicles were all light-duty and were either gasoline powered or hybrid vehicles.

Mileage Reporting Options and Technologies

Three mileage reporting options were available for the Phase 1 pilot including two devices that plug directly into the vehicle’s on-board diagnostic (OBD-II) port and one device that works through an Android smartphone app paired with a credit-card sized device that stayed in the vehicle. Below is a summary of the three options provided:
• **Plug-In Device with Location:** A device designed to plug in to the vehicle’s OBD-II port that automatically calculates the MBUF based on the state(s) where miles were actually driven. The device collects mileage data and gas consumption data directly from the vehicle’s computer, with the location of the miles driven derived from a global positioning system (GPS) chip.

• **Plug-In Device without Location:** A device designed to plug in to the vehicle’s OBD-II port that automatically calculates the MBUF based on *estimates* of the state(s) where miles are driven. The device collects mileage data and gas consumption data directly from the vehicle’s computer. This mileage and gas information is distributed between the home state and adjacent states based on 2010 census statistics coupled with the assumption that most out-of-state mileage has an origin or destination in adjoining states.

• Pre-established assumptions about the percentage of in-state and out-of-state travel. The non-location MBUF reduces privacy concerns regarding trip data but does not provide an accurate connection between the funds collected and where the miles were accrued. Not having the location technology also limits the number of value-added amenities available.

• **Smartphone with Location (Android phones only):** An app downloaded on the participant’s smartphone that works with a credit card-sized device (beacon) to automatically calculate the MBUF. The app uses the phone’s GPS to measure mileage and record the state(s) where miles are driven.

As shown in the graphic to the right, of the 155 participants, 84% chose location-based technology.

**Value-Added Amenities**

Vehicle technology and driver interest in data potentially create an opportunity to change how transportation is funded. An example of the changing landscape is the growing market for devices that use information stored in a vehicle’s computer (or collected by the device) and convert these data into information for drivers. These “value-added” amenities – one of the four key focus areas of the Coalition MBUF effort – were offered to Phase 1 pilot participant to assess the interest in vehicle and driving behavior information. Available amenities included trip logs, vehicle health monitoring, battery voltage monitoring, driver scoring, and “safe zones”.
Pilot Duration and Participant Activities

The pilot commenced on May 1, 2018 and ran for three months ending on July 31, 2018. Pilot participants were asked to perform several activities before, during, and after the pilot as shown in the graphic on the following page.

Mileage Recording and MBUF Calculations

Mileage recording and MBUF calculations, along with collecting the amount of gas used and the corresponding credit, was done automatically by Azuga, the vendor selected to provide mileage reporting hardware and account management support. The driver had no responsibility in this regard other than plugging the device into the OBD-II port at the beginning of the pilot, or – for participants using the smartphone approach – to turn the app on prior to starting a trip.

All mileage driven and recorded during the Phase 1 focused regional pilot was charged the MBUF (less credit for the estimated gas tax) as follows:

- For vehicles that used a location-based approach, all mileage was differentiated by the state where the mileage occurred, with each state’s MBUF rate (derived from each state’s gas tax) applied to the mileage driven in each state.

- For vehicles that used a non-location-based approach, a specified percentage of mileage and gas tax payments was assumed to have occurred in the vehicle’s home state, and the MBUF was
calculated using that state’s per-mile rate and state gas tax. The remaining percentage of the vehicle’s mileage was assumed to have occurred out of the home state, with an average per-mile charge and average gas tax for all out-of-state mileage based on the per-mile rates and state gas taxes in nearby states. These percentages were based on census statistics, coupled with the assumption that most out of state mileage has an origin or destination in adjoining states.

Pilot Survey Results

Two participant surveys were administered electronically over the course of the pilot.

- **Initial Survey:** This survey was administered at the beginning of the pilot after participants enrolled and installed their devices. The survey focused on capturing participants’ attitudes about the enrollment and onboarding processes, as well as their baseline attitudes about an MBUF and knowledge of transportation funding.

- **Final Pilot Survey:** This survey was administered after the pilot was completed and focused on pilot activities, such as the participants’ understanding of and reaction to their first invoice, what participants thought about the accuracy of the data collected, participants’ overall experience, changes in driving behavior, and their experience with the account manager. It also provided a final update on attitudes about an MBUF.

Participant Awareness and Perceptions

Pilots have shown to be an excellent mechanism to help people understand the MBUF concept. As shown in the graph to the right, participating in the Phase 1 Pilot increased participants’ opinions of an MBUF with 75% liking the concept at the beginning of the pilot and 80% at the end. Ninety-four percent of participants support doing more research on MBUF and most participants (more than 90%) indicated they would participate in another pilot program.

Overall, the participant survey results showed overall satisfaction with the Phase 1 Pilot was very high (90%), with the level of satisfaction increasing over the course of the pilot. The average ranking was 4.5 on a scale of 1 to 5, with 5 being very satisfied.
Pilot participants also had an increased awareness of how much they pay in state gas taxes. In the pre-pilot survey, when asked how much they thought they paid in state gas tax each month, participants’ answers ranged from $1 to $500. The monthly MBUF invoices showed the estimated amount of state gas tax paid, with the average amount of state gas tax paid during the pilot being approximately $14 for each participant. The post-pilot survey indicated that 31% of participants thought they actually paid more in state gas taxes, with 7% thinking they paid less.

Of those surveyed, 25 to 30 percent of the participants did not find the invoices and the associated MBUF calculations easy to understand. A redesign of the invoice format may be necessary for future pilots where all costs are shown – gas, federal gas tax, state gas tax, and MBUF – to provide a complete picture of costs. The monthly invoice may also provide additional information on how the fuel usage and associated costs are calculated.

The graphic on the right shows the overall survey feedback on the mileage reporting options. Participants who chose plug-in device options – with and without location – had the highest levels of satisfaction in all categories. Over 90% of participants who chose the plug-in device with location would not switch mileage reporting options, compared to 57% who chose the Smartphone app. In fact, less than half of Smartphone app participants believed this option was a good choice, with nearly 60% experiencing some sort of technical issues. This finding suggests that the Smartphone option may not be the best technical option at this time due to the reliance on participants taking action for the approach to be viable. The survey results also revealed the top reasons participants chose the “plug-in device with location” mileage reporting option: ease of installation (96%), use of GPS (86%), and data accuracy (75%).
Value-Added Amenities and Driver Services

Value-added amenities are a key focus area of the Coalition’s work in the context that such additional services may function as the “spoonful of sugar” that could help in a transition to MBUF. Phase 1 Pilot amenities included: trip logs, vehicle health monitoring, battery voltage monitoring, driver scoring, and “safe zones”. Such amenities could increase acceptance of the MBUF approach. However, as shown in the graphic below, there were mixed reactions to the usefulness of the value-added amenities. Of the amenities offered, participants valued those for vehicle and battery health the most. Overall the usage of the value-added amenities was low with very few participants even used the “safe zone” feature. One conclusion is that they participants were not fully aware of these amenities and how they worked. A solution to implement in future pilot is to provide additional information about the value-added amenities and reminders during the pilot to log in to one’s account.

Privacy Protection and Data Security

Privacy and data security are typically raised as major barriers to an MBUF approach. Of the range of data concerns, the sale of data was a major concern of participants and was the only concern that had an average ranking over 3 (with 5 being very concerned) at the end of the pilot. A key finding of the survey was the revelation that participation in the pilot helped reduce data concerns. The rating of “privacy of my
personal data” as a high concern from the surveys dropped from 57% to 30% of the participants over the course of the pilot. Concern with the “security of data” also dropped as a result of the pilot experience but remained a one of the top three. Participant concerns with data accuracy were consistently lower than the sale, security and privacy of data suggesting some comfort with the MBUF technology.

**Equity and Fairness Perspectives**

A question surrounding MBUF is how an MBUF system would affect different populations (e.g., rural vs. urban or owners of fuel-efficient vehicles). Over the course of the pilot, participant thoughts on the fairness of an MBUF changed especially with regards to very fuel-efficient vehicles, specifically:

- The number of people who believed MBUF was **less fair** for very fuel-efficient cars increased from 27% at the beginning of the pilot to 38%.

- The number of people who believed that an MBUF was **more fair** for very fuel-efficient cars decreased from 39% at the beginning of the pilot to 24%.

**Education and Outreach Activities**

The importance of education and outreach cannot be overstated. The lack of understanding of drivers about the infrastructure funding needs and the long-term issues with the fuel tax could pose one of the greatest hurdles to solving the transportation funding issue.

Based on the Coalition’s and project team’s previous experience and lessons learned from other states investigating the feasibility of an MBUF, it was recognized how critical it is to understand public values, beliefs, and priorities around transportation, and then create an MBUF education and outreach campaign and materials with these considerations in mind.
Education and outreach were major components of the study, with efforts to inform people about the need to establish a sustainable and equitable transportation funding approach as well as the MBUF concept. Key target audiences for these efforts included decision-makers such as legislators, other elected officials, DOTs, DMVs, tolling agencies, interest groups (e.g., trucking associations, AAA), and the public in states within the study area. The following techniques and materials were developed:

**Communicating with Participants**

A [website](#) included a project overview, information about the current fuel tax funding system, information from other MBUF studies, frequently asked questions, news articles about the study, a calculator for users to see what they could pay under an MBUF system as compared to the current fuel tax, and fact sheets about the study. In addition, the website was used to share information with participants.

The Coalition also developed a more than three-minute [video](#) briefly describing the need for a sustainable funding approach for transportation, the MBUF concept, the results of the Phase 1 pilot, and setting the stage of future phases of the Coalition’s work.

Members of the Coalition also did a number of presentations during the study, sharing general information on the issues with the current fuel tax funding system, the concept of MBUF, and the study that was underway.

**Pilot Findings/Results**

**Privacy**

Studies and surveys have identified [privacy concerns as one of the participants’ key objections to a MBUF system](#) (or any system requiring personal data). A related concern is the security of the data that are collected. The Phase 1 effort reviewed numerous studies and surveys regarding privacy. This included the European Union’s (EU) General Data Protection Regulation (GDPR), which was adopted in mid-2016 and went into effect on May 25, 2018. (While the US has enacted privacy rules in areas such as health care, it has never passed an overarching data-protection law at the federal level.). A more robust explanation on privacy concerns can be found in a [tech memo](#) on the pilot’s website.

**Administration and Compliance**

Another MBUF issue often identified involves the additional costs, potential bureaucracy, and enforcement requirements associated with administering an MBUF system relative to the fuel tax. To help understand the administrative requirements, it is helpful to understand how a mandated
MBUF might function. It is envisioned that the private sector will play a lead role in developing and managing an MBUF system. This includes commercial account managers (CAMs) – private entities that provide technology-based approaches for MBUF along with other driver services and amenities. There will also likely be a state account manager (SAM) that provides manual approaches such as an annual time permit (for unlimited mileage) and manual odometer readings (as part of a mandated safety inspection and/or emissions testing program). The SAM would accommodate those individuals that do not want a technology-based approach (as provided by CAMs), as well as those individuals who do not have credit cards or bank accounts, or have poor credit, resulting in a CAM not supporting them as a customer.

As part of the project, a high-level financial analysis was performed comparing MBUF revenues and costs relative to the current fuel tax system. Two analyses were performed – one for Delaware and one for Pennsylvania (the two states providing match funding for Phase 1). More information on administration and compliance can be found in a tech memo on the pilot’s website.

Equity

The MBUF concept is based on the “user pays” principle whereby those who use the transportation network pay an amount proportional to how much they use it. Fairness and equity issues are frequently raised with respect to how an MBUF is applied across different population and demographic groups. Some areas of concern include drivers with longer commutes, income differences, vehicle type, differences in fuel efficiency, and urban-rural concerns. More information on equity concerns are available in a tech memo on the pilot’s website.

Out-of-State Mileage

This pilot was the first to fully address the issue of out-of-state travel under a MBUF system and the potential impact on transportation funding, including charging for out of state mileage. This was one of the key focus areas of this I95 Corridor Coalition MBUF study given the significant amount of cross state travel that occurs along the eastern seaboard. The Phase 1 Pilot fully demonstrated why it is so critical to address out of state mileage in any MBUF system along the eastern seaboard – of the 459,448 total miles driven during the pilot, more than 20% were outside the participant’s home state.

The Phase 1 Pilot did demonstrate that such an approach for distributing MBUF between states for drivers who do not use a location-based approach is valid. What is necessary are more accurate percentages reflecting out of state mileage – information that could be obtained and regularly updated using MBUF data from a significantly large (and statistically accurate) number of participants in a mandated system; and assuming that most of these drivers would be using
location-based technologies to record mileage. More information on out-of-state mileage can be found in a tech memo on the pilot’s website.

Summary
The I-95 Corridor Coalition Pilot successfully started the conversation on the east coast about the feasibility of MBUF. As the first MBUF pilot along the eastern seaboard, the “east coast voice” was brought into to the national MBUF discussion. The pilot was the first in the nation to dive deeply into the unique challenges of managing out-of-state mileage, approaches to the associated interstate transfer of MBUF funds, and interoperability with toll facilities. It also provided an opportunity for key stakeholders – both within the Corridor and nationally – to gain a first-hand understanding of how MBUF could work and reduce some of the concerns that individuals and the public at large may have regarding this concept. The pilot, along with the various Phase 1 analyses, addressed each of the project goals and potential MBUF issues, including privacy and data security, equity and fairness, and administration needs and the associated costs.
For more information about the Phase 1 Pilot, please visit www.i95mbufcoalition.org.

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