FAST Act Section 6020: Surface Transportation System Funding Alternatives (STSFA) Biennial Report

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16. Abstract This biennial report provides an update on the status of the 10 active Surface Transportation Systems Funding Alternatives (STSFA) demonstration projects and describes key lessons learned from the demonstrations for which formal evaluations have been conducted. This report is a high-level summary and synthesis. Detailed descriptions of individual STSFA demonstration programs and evaluation findings are available in the individual annual reports submitted by the grantees and in the evaluation reports. The evaluations identified several important factors for implementation of road-user charge programs: data security, interoperability among multiple States, program administrative costs, and public acceptance.		
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SI* (MODERN METRIC) CONVERSION FACTORS

APPROXIMATE CONVERSIONS TO SI UNITS

Symbol	When You Know	Multiply By	To Find	Symbol
		LENGTH		
in	inches	25.4	millimeters	mm
ft	feet	0.305	meters	m
yd	yards	0.914	meters	m
mi	miles	1.61	kilometers	km
		AREA		
in^2	square inches	645.2	square millimeters	mm^2
ft^2	square feet	0.093	square meters	m^2
yd^2	square yard	0.836	square meters	m^2
ac	acres	0.405	hectares	ha
mi^2	square miles	2.59	square kilometers	km^2
		VOLUME		
fl oz	fluid ounces	29.57	milliliters	mL
gal	gallons	3.785	liters	L
ft^3	cubic feet	0.028	cubic meters	m^3
yd^3	cubic yards	0.765	cubic meters	m^3
		NOTE: volumes greater than 1000 L shall be shown in m^3		
		MASS		
oz	ounces	28.35	grams	g
lb	pounds	0.454	kilograms	kg
T	short tons (2000 lb)	0.907	megagrams (or "metric ton")	Mg (or "t")
		TEMPERATURE (exact degrees)		
°F	Fahrenheit	5 (F-32)/9 or (F-32)/1.8	Celsius	°C
		ILLUMINATION		
fc	foot-candles	10.76	lux	lx
fl	foot-Lamberts	3.426	candela/m^2	cd/m^2
		FORCE and PRESSURE or STRESS		
lbf	poundforce	4.45	newtons	N
lbf/in^2	poundforce per square inch	6.89	kilopascals	kPa

APPROXIMATE CONVERSIONS FROM SI UNITS

Symbol	When You Know	Multiply By	To Find	Symbol
		LENGTH		
mm	millimeters	0.039	inches	in
m	meters	3.28	feet	ft
m	meters	1.09	yards	yd
km	kilometers	0.621	miles	mi
		AREA		
mm^2	square millimeters	0.0016	square inches	in^2
m^2	square meters	10.764	square feet	ft^2
m^2	square meters	1.195	square yards	yd^2
ha	hectares	2.47	acres	ac
km^2	square kilometers	0.386	square miles	mi^2
		VOLUME		
mL	milliliters	0.034	fluid ounces	fl oz
L	liters	0.264	gallons	gal
m^3	cubic meters	35.314	cubic feet	ft^3
m^3	cubic meters	1.307	cubic yards	yd^3
		MASS		
g	grams	0.035	ounces	oz
kg	kilograms	2.202	pounds	lb
Mg (or "t")	megagrams (or "metric ton")	1.103	short tons (2000 lb)	T
		TEMPERATURE (exact degrees)		
°C	Celsius	1.8C+32	Fahrenheit	°F
		ILLUMINATION		
lx	lux	0.0929	foot-candles	fc
cd/m^2	candela/m^2	0.2919	foot-Lamberts	fl
		FORCE and PRESSURE or STRESS		
N	newtons	0.225	poundforce	lbf
kPa	kilopascals	0.145	poundforce per square inch	lbf/in^2

*SI is the symbol for the International System of Units. Appropriate rounding should be made to comply with Section 4 of ASTM E380.
(Revised March 2003)

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List of Acronyms

Acronym	Definition
CDOT	Colorado Department of Transportation
ConOps	Concept of Operations
DOR	Department of Revenue
DOT	U.S. Department of Transportation
DBUF	Distance-based User Fee
EPA	Environmental Protection Agency
FAST Act	Fixing America's Surface Transportation Act
FHWA	Federal Highway Administration
FY	Fiscal Year
GIS	Geographic Information System
GPS	Global Positioning System
MaaS	Mobility-as-a-Service
MBUF	Mileage-based User Fee
MnDOT	Minnesota Department of Transportation
MPG	Miles Per Gallon
OBD	On-board Diagnostics
OReGO	Oregon's Road User Charge Program
RFP	Request for Proposal
RUC	Road User Charge
RUCPP	Road User Charge Pilot Program
RUC West	Western Road User Charge Consortium
SM	Shared Mobility
STSFA	Surface Transportation System Funding Alternatives Program
UDOT	Utah Department of Transportation
UBI	User-based Insurance
State DOT	State department of transportation

Executive Summary

This 2019 Biennial Report provides an update on the status of the 10 active Surface Transportation System Funding Alternatives (STSFA) demonstration projects and describes key lessons learned from the demonstrations for which formal evaluations have been conducted. This report is a high-level summary and synthesis. Detailed descriptions of individual STSFA demonstration programs and evaluation findings are available in the annual reports submitted by the grantees, and in their individual evaluation reports.

Background on STSFA Program

The Fixing America's Surface Transportation (FAST) Act (Pub. L. 114-94), Section 6020, directed the U.S. Department of Transportation (DOT) to establish the STSFA Program, with funding levels of $15,000,000 in fiscal year (FY) 2016 and $20,000,000 in each of FYs 2017-20. The funds are derived from a set-aside from the Highway Research and Development Program under section 503(b) of Title 23, United States Code. The purpose of the program is to provide grants to States to demonstrate user-based alternative revenue mechanisms that utilize a user fee structure to maintain the long-term solvency of the Highway Trust Fund. These grants must comprise no more than 50 percent of total proposed project costs, with the remainder coming from non-Federal sources. If there are not enough qualified proposals submitted in a given year, on or before August 1 of each year, the Secretary of Transportation must transfer available funds back to the Highway Research and Development Program. Section 6020 also provides specific factors that each demonstration project funded under the statute must address, including: testing, design, implementation, and acceptance of functional future user-based alternative revenue mechanisms that minimize administrative costs; increasing public awareness of the need for, and possible approaches to, alternative funding sources for surface transportation programs; and providing recommendations on various approaches. Projects must also address implementation, interoperability, public acceptance and potential hurdles to adoption of the demonstrated user-based alternative revenue mechanism, privacy protection, use of independent and private third-party vendors, congestion mitigation impacts, equity concerns, ease of user compliance, and the reliability and security of technology used. Geographic diversity is a statutory requirement. The grants require a State department of transportation (State DOT) lead.

Each State recipient of a grant under the STSFA Program is required to submit an annual report to DOT that describes how the demonstration activities carried out with grant funds meet the objectives of the program, and lessons learned for future deployment of alternative revenue mechanisms that utilize a user fee structure. The first biennial report was due 1 year after the first grant was awarded to a project under the program. Section 6020 also requires DOT to produce this biennial report on the demonstration activities carried out under the STSFA Program, and to make it publicly available on the internet. Quarterly and/or annual reports, along with information from the independent evaluations conducted by partner States, provide the primary inputs for the biennial reports.

Summary of Key Findings

Independent evaluations have been prepared for six of the STSFA demonstration programs based on their initial (Phase I) pilot activities. Although all the STSFA demonstration programs are in their early stages, a synthesis of the evaluation results reveals certain factors that appear to be critically important for the success of road user charge (RUC) programs:

- Data and Communications Security: Secure data management practices are critical for ensuring driver privacy and accurate mileage-based road-user charges, and for addressing the means by which system components collect, store, and transmit data. Several of the STSFA demonstration programs have documented key considerations for implementing secure RUC programs. These include secure data storage, transmission, access, and privacy.

- Public Acceptance: The key communications and messaging themes that have emerged consistently from the various pilot sites determined that "fairness" is a key message that is likely to resonate with stakeholders. It is critical to ensure the importance of educating the public about how transportation funding currently works and validate concerns while providing evidence-based reasoning to allay them.

- Interoperability: Several of the STSFA demonstration programs have documented elements necessary for implementing RUC programs across multiple States. These involve system architecture, data standards, mileage allocation, and institutional agreements.

- Programmatic Costs: RUC programs will have higher programmatic costs than traditional fuel tax programs due to administrative complexity, system and data processing requirements, public outreach, certification, ongoing monitoring of account managers, changes to department of motor vehicle (DMV) operations and software to support system enrollment, and the establishment of appropriate enforcement structures.

Introduction

STSFA Demonstration Program Funding History

As of 2020, the STSFA program has awarded $40 million in demonstration funds. In FY 2016, after the obligation limitation takedown that occurs each funding cycle, $14.2 million was awarded to eight projects in seven States for STSFA demonstration projects. In FY 2017, $15.5 million was awarded to seven projects in six States, and in FY 2018, $10.2 million was awarded to seven projects in seven States for STSFA demonstration projects. The notice of funding opportunity for FY 2019 and FY 2020 cycle has been combined, and there will be two submission deadlines. The first deadline to submit proposals was October 15, 2019. The second deadline was extended to July 10, 2020.

There are currently 10 STSFA demonstration project lead States, all but 3 of which have been active since the program's inception. Two of the lead States represent multi-State organizations. Delaware is the lead State representing the I-95 Corridor Coalition. The I-95 Corridor Coalition is an alliance of transportation agencies, toll authorities, and related organizations, including public safety, from the States of Maine to Florida, with affiliate members in Canada. The Coalition provides a forum for key decision and policy makers to address transportation management and operations issues of common interest. There are 16 member-State DOTs in addition to other transportation agencies in the coalition.

The second multi-State STSFA participant is the Western Road User Charge Consortium (RUC West). The RUC West brings together leaders from State transportation organizations to share best practices, ideas, and information on RUC. The group acts as a source for those interested in RUC and provides case studies, best practices, and the most up-to-date information available on RUC. Currently, RUC West comprises States in the western portion of the U.S. Participation is categorized in three tiers. Oregon is the only Tier 1 State that has enacted policy that allows the implementation of a RUC Program. Five Tier 2 States are testing RUC pilot programs: California, Colorado, Hawaii, Utah, and Washington. Eight Tier 3 States are researching RUC: Arizona, Idaho, Montana, Nevada, New Mexico, North Dakota, Oklahoma, and Texas. The RUC West allows State DOTs to pool their resources to study outcomes and share best practices. The RUC West has already fully funded 13 projects related to feasibility and implementation of RUC.

Projects receiving funding in multiple years have had specific objectives for each grant, as described by State. Figure 1shows the current RUC West and I-95 Corridor Coalition member States. Figures 2 through 4 show STSFA applications by year (FY 2016 – FY 2018).
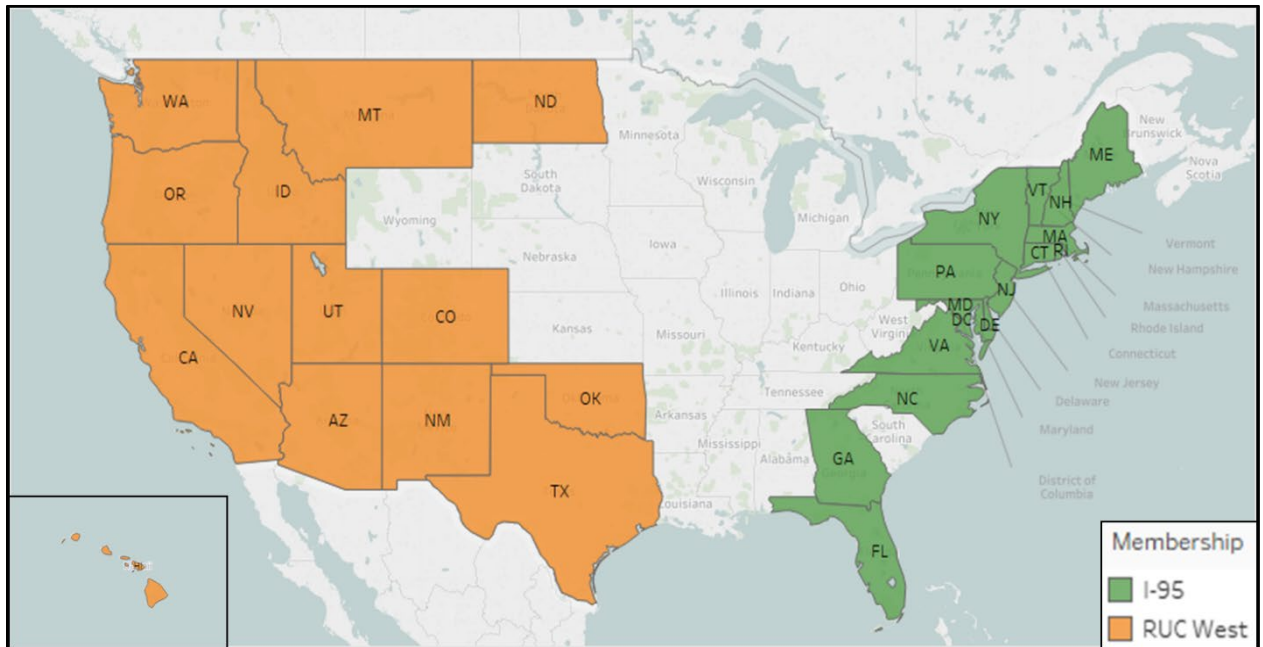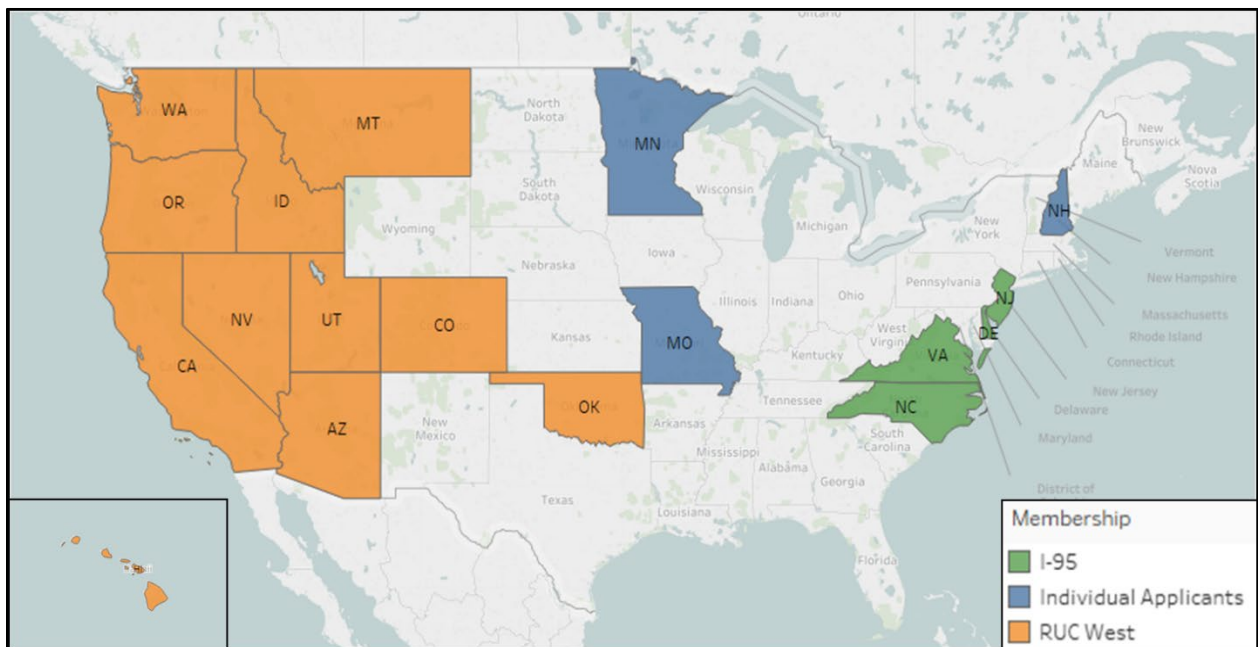
Figure 1: Current RUC West and I-95 Corridor Coalition Members
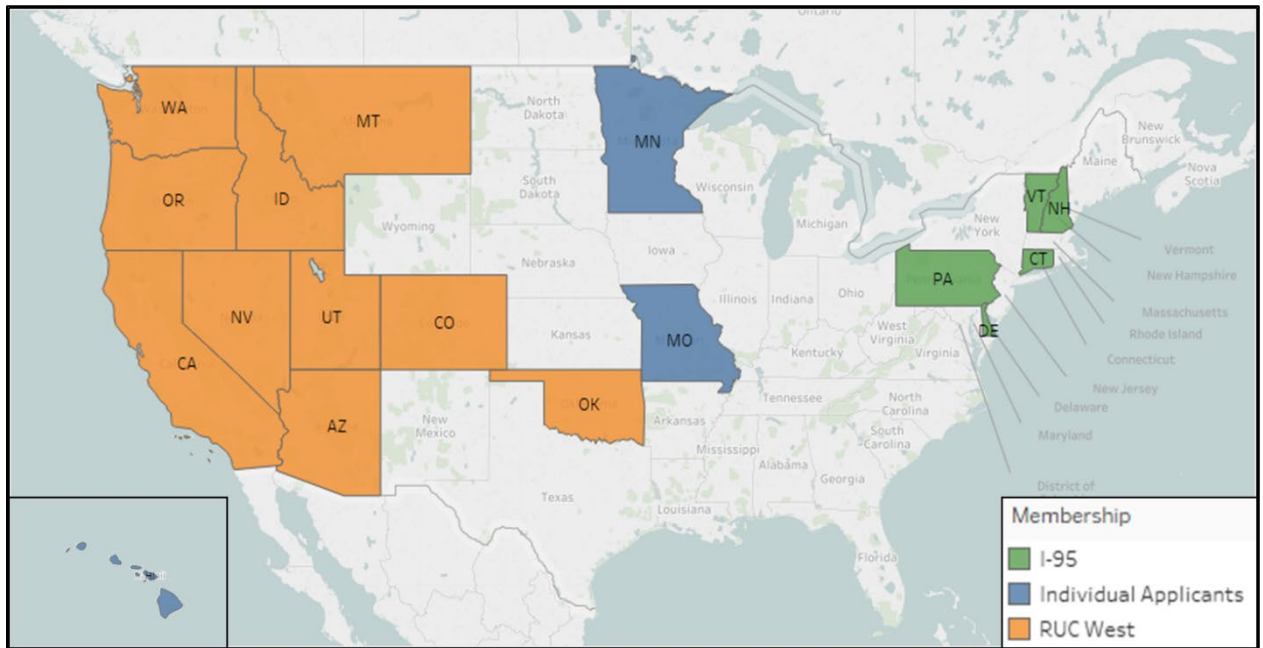
Figure 3. STSFA Applicants in FY 2016
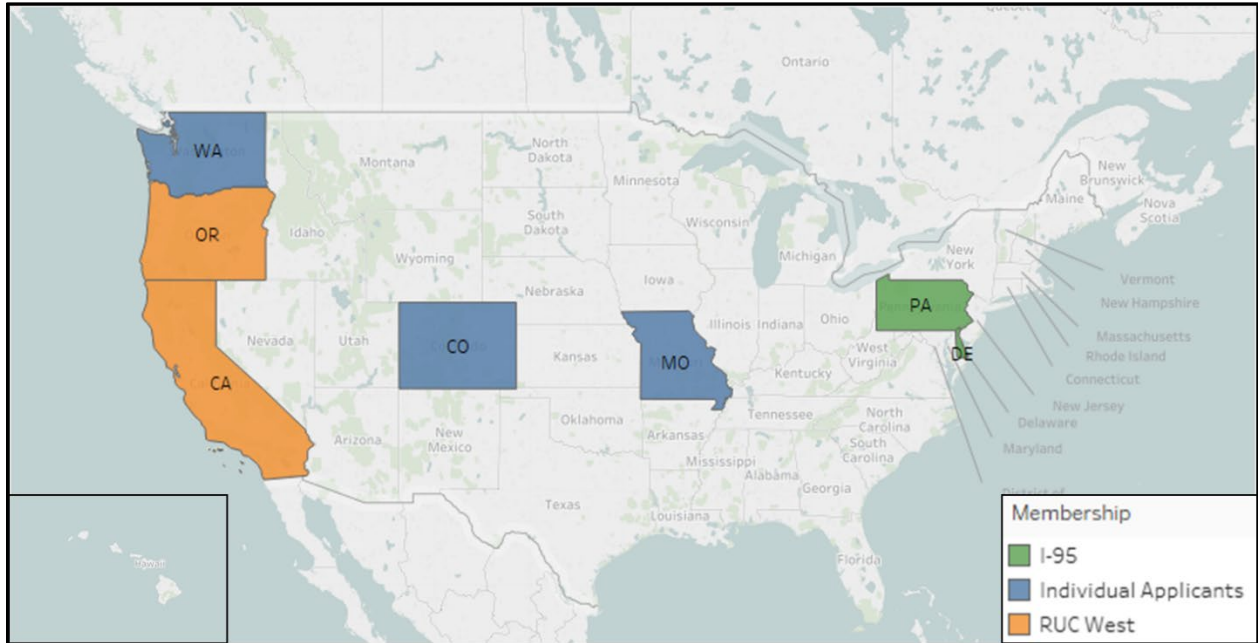
Figure 4. STSFA Applicants in FY 2017

Figure 5. STSFA Applicants in FY 2018

Status of STSFA Grant Projects

This section summarizes the funding history and status of the active STSFA demonstration projects.

California

Funding and Objectives:

Fiscal Year	Amount Granted	Objective(s)
2016	$750,000	Test a RUC pilot using pay-at-the-pump/charging stations
2017	$1,750,000	Explore mechanisms to collect revenue at pay-at-the-pump/charging stations
2018	$2,030,000	Explore using other emerging technologies in California's RUC Program, such as usage-based insurance, transportation network companies, and automated vehicles

Program Approach and Design: California completed a State-funded mileage-based revenue collection pilot in March 2017. This pilot, known as the Road Charge Pilot Program, included more than 5,000 participants and tested the functionality, complexity, and feasibility of a mileage-based system as a potential new revenue collection method for transportation funding. With funding awarded as part of the STSFA, California initiated a Phase I Program (FY 2016) that enhanced the completed pilot with the following activities:

- Assessed which agencies could administer a statewide road charge program.

- Developed a road charge revenue flow model that could be used as a tool to assess the costs and benefits of a new program.

- Identified elements of an enforcement program and associated strategies for ensuring compliance.

- Invested technologies for paying a road charge at gas stations or electric charge ports.

More information is available at: at https://www.californiaroadchargepilot.com/.

Status: California's STSFA Phase I activities are concluded, and a Phase I independent evaluation has been completed. California was able to carry out the majority of its planned STSFA Phase I activities, with the exception of public education and outreach. The top ranked message about transportation funding according to survey results reported in California's Phase I Communications Research Final Report was, "road charge balances the way roads are funded so all vehicles share the cost based on how much they use the road, regardless of their mileage per

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gallon or type of fuel." FY 2017 and FY 2018 STSFA pilot program activities are now underway.

Colorado

Funding and Objectives:

Fiscal Year	Amount Granted	Objective(s)
2016	N/A	N/A
2017	$500,000	Investigate data collection mechanisms, address concerns from the agricultural and rural community identified in the Colorado Road User Charge Pilot Program
2018	N/A	N/A

Program Approach and Design: In 2016, the Colorado Department of Transportation (CDOT) launched a State-funded Colorado Road Usage Charge Pilot Program (RUCPP). The program included 250 volunteers participating in a demonstration project to gauge and improve user acceptance and system functionality. Focusing specifically on the needs and equity concerns of drivers from the agriculture and rural communities, the goals of the pilot were to demonstrate an operational RUC, identify and evaluate concerns and issues, test the feasibility of various mileage-reporting options, and solicit feedback and ideas. Phase I of the project focused on development activities such as creating project management plans and upgrading CDOT's geographic information system (GIS) and road management data. More information on the pilot is available at https://www.codot.gov/programs/ruc.

Status: CDOT's pilot program concluded in April 2017. The final report was released in December 2017. Overall, the pilot participants said that they were satisfied with their experience. The CDOT has secured a contractor and will be launching its enhanced pilot soon. The Colorado RUCPP will enhance the pilot through improved system functionality by upgrading CDOT's GIS and road management data to allow for the delineation of public and private roads, offering an additional mileage reporting option (automated vehicle location) for farm equipment, improving the existing mile reporting options through refinement of the Colorado RUCPP mobile application, and partnering with the Colorado Department of Revenue (DOR) to define the RUC collection methodology and other administrative system improvements.

Delaware

Funding and Objectives:

Fiscal Year	Amount Granted	Objective(s)
2016	$1,490,000	Conduct planning activities and initial deployment of a mileage-based user fee (MBUF) pilot within participating I-95 Corridor Coalition States (Connecticut, Delaware, New Hampshire, Pennsylvania, and Vermont)
2017	$975,000	Study equitability and privacy issues in a multi-State region (Delaware, North Carolina, Pennsylvania, and Virginia)
2018	$3,028,000	Address the requirements for implementation, interoperability, public acceptance, and other potential hurdles of implementing mileage-based fees in a multi-State region (California and Oregon)

Program Approach and Design: The STSFA Phase I grant awarded funds to the Delaware DOT, acting on behalf of the I-95 Corridor Coalition. The project was to support planning and pre-deployment activities of a MBUF within the I-95 Corridor Coalition States, as well as the launch of 3-month, State-specific pilots in two of the States, Delaware and Pennsylvania. Initially five States participated in the pilot. However, Connecticut, New Hampshire, and Vermont subsequently withdrew their participation. The Phase I pilots included two options for mileage tracking – drivers relied on vehicle telematics using the vehicle's On-Board Diagnostics (OBD)-II port, with or without enabled location, or on a location-enabled smartphone app. Phase I activities included planning and pre-deployment activities from a multi-State perspective, as well as the deployment, operation, and evaluation of State-specific MBUF pilots. The goals of the pilot were to see whether out-of-State mileage could be accurately recorded by participants using both location-based and non-location based mileage reporting options, explore the feasibility of using MBUF technologies to calculate tolls on existing toll roads using E-Z Pass toll charge infrastructure, engage in public education and outreach, and address potential hurdles (e.g. privacy protection, equity concerns, ease of user compliance, flexibility and user choice, cost of administering the system, auditing, and compliance/enforcement). More information is available at https://www.i95coalitionmbuf.org/.

Status: The Phase I pilot, conducted from May to July 2018, involved 155 participants from 13 States, and logged 459,458 miles. Mileage was reported either using a plug-device (i.e. OBD-II port), with or without enabled location, or a location-enabled smartphone app. Value-added services, such as trip logs, battery or vehicle health notifications, driving scores, and safe zones, were provided to the participants. Surveys of drivers who participated in the Phase I pilot revealed that the value-added amenities were not as appealing as initially assumed. Additional survey results showed that the majority of participant concerns were related to data security and privacy, and that pilot participation helped alleviate these worries. Pennsylvania and Delaware

DOTs led the efforts to identify and recruit pilot participants, which included DOT and DMV executives, legislative aides, staff from metropolitan planning areas, and the media. While Phase I met its goal of public education and outreach, the results might be skewed, because the majority of participants had a transportation background. Moreover, a cash-payment option is needed for drivers who lack bank accounts and/or credit cards. Overall, the pilot demonstrated that a MBUF system is feasible and capable of accounting for Interstate travel. The number of I-95 Corridor Coalition States actively participating in the RUC pilots has increased, and, in 2018, New Hampshire submitted a proposal to conduct an independent pilot, described later in this report.

Hawaii

Funding and Objectives:

Fiscal Year	Amount Granted	Objective(s)
2016	$3,998,000	Explore a user fee collection based on manual and automated odometer readings at inspection stations
2017	N/A	N/A
2018	N/A	N/A

Program Approach and Design: The Hawaii RUC pilot seeks to understand how mileage-based fees would affect the purchase and use of high-mileage-per-gallon or alternative fuel vehicles. The pilot will build on existing State infrastructure that collects odometer readings annually as the basis for testing the RUC system. The project involves implementation of an accounting system to provide prototypical invoices (or "billings") for mileage driven and other direct communications about revenue alternatives to over 1 million motorists. Billings will feature personalized information about motorists' road use and corresponding RUC, gas taxes paid, and other fees. More information is available at https://hiruc.org.

Status: Procurement of the consultant for the Hawaii pilot was delayed, but was resolved as of the second calendar quarter in 2018. As of January 2019, the Hawaii pilot completed several activities, including forming an executive steering committee, collecting a sample data set for validation and testing, conducting 10 focus group meetings, and completing the design of a telephone survey. The team also sponsored community meetings throughout the State. Hawaii anticipates launching its pilot in early 2020.

Minnesota

Funding and Objectives:

Fiscal Year	Amount Granted	Objective(s)
2016	$300,000	Use of Mobility-as-a-Service providers (MaaS) as the revenue collection mechanism by charging distance-based user fees (DBUF); the goals of Phase I are to design an affordable DBUF program premised on shared mobility, create MaaS partnerships that can leverage existing onboard technologies that could be used to collect DBUFs, and conduct a limited proof-of-concept demonstration of data transfer between shared mobility providers and MnDOT
2017	N/A	N/A
2018	$999,600	Demonstration of the feasibility of distance-based user fees through the MaaS shared mobility model

Program Approach and Design: Minnesota is not focused on replacing the gas tax. Instead, the State is exploring options to supplement dwindling gas tax revenues. Minnesota proposed a distance-based RUC concept that involves collaborating with a MaaS provider (e.g. Uber, Lyft, HourCar). This system works alongside the motor fuel tax, rather than replacing it. Minnesota would collect mileage fees from these commercial mobility providers in exchange for fuel tax rebates and other financial incentives. The MnDOT expects that this MaaS model will afford better data security and system reliability due to its use of a private third-party data repository and an already-implemented mileage-tracking technology. Components of the STSFA Phase I included:

- Collaborate with and recruit MaaS providers.
- Modeling price strategies and exploring multi-modal price options.
- Engaging in Stakeholder outreach and developing and executing legislative strategies.
- Gauging public interest and acceptance of a distance-based fee approach.
- Researching state-of-the-art in distance-based fee collection.
- Developing planning and design for the deployment of Phase II, which included designing back-office operations.

More information is available at http://www.dot.state.mn.us/distancebaseduserfee/planning-development.html.

Status: At the completion of its Phase I activities, Minnesota produced a concept of operations (ConOps), carried out and summarized the results of stakeholder outreach, and executed a 2-week proof of concept with 56 vehicles and 23,000 miles. The proof of concept validated the

ability of MnDOT to download and put mileage data in a secure depository. Building upon the demonstration implementation planning portion of Phase I, MnDOT submitted a grant project application under Section 6020 of the FAST Act in July 2018 for a DBUF demonstration (Phase II). The proposal, which was awarded funding in February 2019, identified a series of comprehensive tasks and schedules needed to plan, design, deploy, administer, communicate, and evaluate the 12-month demonstration. The MnDOT will partner with shared mobility SM providers to test the feasibility of assessing a DBUF on SM vehicle fleets. Data will be collected per vehicle to calculate and assess DBUFs (equating to 2.7 cents per mile). State and Federal motor fuel taxes will be subtracted from the total based on the number of gallons consumed and miles traveled within Minnesota. The Minnesota DOR will receive electronic financial reports and invoices detailing the net DBUFs, and will assess charges and reconcile accounts as necessary. The DOR will also evaluate potential revenue impacts and may conduct audits as necessary to validate shared mobility provider data. All DBUF charges reported during the demonstration will be simulated, and no real monies will be collected. In July 2019, MnDOT and FHWA finalized a cooperative agreement to conduct the Phase II Demonstration. The agreement allows MnDOT to enter into contracts with the consultant teams and to develop, implement, and launch the demonstration.

Missouri

Funding and Objectives:

Fiscal Year	Amount Granted	Objective(s)
2016	$250,000	Implementation of a new registration fee schedule based on estimated miles per gallon
2017	$2,772,000	Conduct public outreach on concerns related to equity and data security issues
2018	$1,782,000	Deploy innovative strategies such as vehicle registration fees along with other user-based charges

Program Approach and Design: Missouri's proposed user-based alternative revenue mechanism does not anticipate replacing its current gas tax; rather, it proposes to supplement the diminishing Highway Trust Fund revenue by changing registration fees. A mileage-based approach is not feasible in Missouri due to a State constitutional amendment that restricts programmatic costs of motor fuel tax collection to 3 percent of gross revenues. The existing motor fuel tax system includes a registration fee system based on taxable horsepower, a calculation which today is often outdated, inaccurate, or both. By charging vehicle licensing fees, Missouri will be able to maintain the Highway Trust Fund revenue stream while simultaneously addressing the existing payment inequity between high and low efficiency vehicles. Specifically, low efficiency vehicles will be charged a smaller registration fee than high efficiency vehicles, as lower efficiency vehicles carry a larger motor fuel tax burden. Missouri's STSFA Phase I activities developed a new sliding scale fee schedule for vehicles averaging greater than 20 miles per gallon (MPG) and provided additional education and outreach to the Missouri General Assembly with regards to alternate funding and new technology for transportation infrastructure.

Status: As a result of its STSFA Phase I activities, Missouri built a dynamic financial modeling tool to show how its proposed vehicle registration fee schedule could be used to replace the existing vehicle registration fee schedule. In addition, Missouri developed a ConOps that describes its proposed MPG-based fee schedule. Finally, Missouri produced a technical memorandum on vehicle identification number decoding and analysis, which outlines how to identify each passenger vehicle with the appropriate U.S. Environmental Protection Agency (EPA)-estimated fuel economy, fuel type, and other vehicle descriptors needed for the proposed schedule. These data are used in Missouri's STSFA financial model to analyze the potential impacts of transitioning away from the existing schedule to the proposed new one.

Missouri worked with the State General Assembly to develop language that in the future could be used to create RUC legislation. Missouri also organized a State innovation forum in which stakeholders could present their ideas on possible solutions to transportation funding problems. Legislative authority to move to a MPG based registration schedule did not pass in the 2019 General Assembly. Staff is preparing to propose the MPG-based registration fee schedule during the upcoming 2020 General Assembly.

New Hampshire

Funding and Objectives:

Fiscal Year	Amount Granted	Objective(s)
2016	N/A	N/A
2017	N/A	N/A
2018	$250,000	Investigate the feasibility and impact of using a road user fee (RUF) levied in conjunction with vehicle registration

Program Approach and Design: The New Hampshire DOT intends to implement a RUF, based on the EPA fuel economy rating of the vehicle that would charge vehicles with higher mileage per gallon a larger fee. Phase I of its deployment plan includes estimating the revenue potential of the new RUF compared to the existing motor fuel tax revenue, exploring any uncertainties associated with key factors influencing revenue projections, evaluating the equity implications of the proposed new fee, researching public opinion on the proposed RUF, considering policy design options, and developing a work and evaluation plan for Phase II. Depending on the results of Phase I, Phase II may involve either an interim testing step, a small-scale implementation, or full statewide implementation.

Status: New Hampshire's STSFA demonstration program was awarded FY18 funds in March 2019, and project related activities are now getting underway.

Oregon

Funding and Objectives:

Fiscal Year	Amount Granted	Objective(s)
2016	$2,100,000	Improve Oregon's existing RUC Program
2017	$2,315,000	Improve the scalability of Oregon's RUC Program (OReGO) and demonstrate its utility as a funding source for local jurisdictions; as such, the OReGO system needs to prove that it is flexible enough to accommodate varying tax rates and jurisdictional types
2018	N/A	N/A

Program Approach and Design: Oregon's RUC Program, OReGO, has been operating since July 2015. It is Oregon Department of Transportation's (ODOT) opinion that their program demonstrates that it is possible to charge drivers more equitably through miles driven, as opposed to fuel purchased. By leveraging private sector account managers, the program is able provide reliable, effective customer service and consumer choice. The ODOT believes it demonstrates that a fuel tax and road usage charge can coexist without double taxation, streamlining the driver/taxpayer experience.

The State is using STSFA funds to enhance the current system Oregon already has in place. Oregon will carry out 3 simultaneous, 6-month pilots with up to 100 passenger vehicles each. The first simulation will focus on area pricing in which an area is geographically bounded and a local RUC rate is added to the broader statewide RUC rate during specific times. The second simulation will overlap two geo-fenced areas and test different RUC rates during certain times of the day. The third simulation will look at corridor pricing, where drivers are charged different RUC rates for shorter trips on freeway corridors during certain times of the day to preserve capacity for through trips. More information is available at: http://www.myorego.org/.

Status: As of the first quarter of 2019, Oregon has defined a ConOps and its high-level program architecture, drafted requests for proposals (RFPs) and statements of work, updated its RFP for posting, and continued progress updates to the program's technical working group.

Oregon/Western RUC Consortium

Funding and Objectives:

Fiscal Year	Amount Granted	Objective(s)
2016	$1,500,000	Define and outline a multi-State pilot focused on consistency, interoperability, and compatibility
2017	$2,590,000	Launch a pilot between California and Oregon which connects the two States' per-mile road user charging system, with the ultimate goal of expanding the concept regionally
2018	$950,000	Continue exploring road user charge systems and automated vehicles at both the State and regional levels

Program Approach and Design: The ODOT is the lead agency for RUC West's application. The RUC West is a voluntary coalition of 14 State DOTs (Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, North Dakota, Oklahoma, Oregon, Texas, Utah, and Washington) looking to tackle the policy, organizational, technological, and operational challenges associated with RUC. Since 2013, RUC West has attempted to resolve many of the technological and operational challenges involved in improving the future of transportation infrastructure funding. Through 5 years of research and pilot programs, the consortium has developed the groundwork for per-mile RUC while addressing issues such as interoperability, privacy, public education, and rural/urban equity.

The purpose of RUC West's Phase I pre-deployment activities was to define and plan a consistent, interoperable, and compatible multi-State RUC. Phase I was divided into two parts. Phase 1A included efforts by all participating States to create system definition of a multi-State pilot. Phase 1B, which included only California, Colorado, Oregon, and Washington, focused on the development of the regional pilot project plans to be carried out in STSFA Phase II. The RUC West's Phase I included the following activities:[1]

- Researching and drafting pilot plans.

- Pulling together technical design documents.

- Creating a communications plan along with information folios and media kits.

- Gauging private sector vendor interest.

- Compiling a list of future considerations for RUC development.

More information is available at https://www.rucwest.org/.

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[1] Because RUC West is a multi-State coalition and does not recommend specific technologies, several STSFA pilot requirements related to technology use (e.g. data and communications security, charging accuracy, and user payment evasion) were not detailed in Phase 1.

Status: The two main accomplishments of RUC West's Phase I were the creation of a high-level ConOps outlining the basic principles of a regional RUC system as they apply to future pilots, and the creation of a document detailing future multi-State pilot system and business requirements, based on the results of the California and Oregon pilots. The implication of these findings show that States are able to coordinate the technical and logistical challenges of launching a multi-State RUC Program. Overall, Phase I activities affirm the feasibility of RUC interoperability, find some RUC compatibility with low-technology (though Global Positioning System [GPS]-based technology is the most conducive for compliance), present several strategies for minimizing system administrative costs, and identify a need to further examine user privacy, equity, ease of use, and public acceptance issues.

Utah

Funding and Objectives:

Fiscal Year	Amount Granted	Objective(s)
2016	N/A	N/A
2017	N/A	N/A
2018	$1,250,000	Pilot a road user charge program for alternative fuel vehicles including hybrid and electric vehicles

Utah Department of Transportation (UDOT) was awarded FY 2018 STSFA funds in March 2019. Utah joined Oregon in January 2020 as the only other State operating an ongoing system collecting real tax payments through a RUC Program. Approximately 44,000 electric and hybrid vehicles in Utah are eligible for participation in the RUC Program. If even a small portion of eligible vehicle owners choose to enroll, Utah's program has the potential to be the largest-scale implementation of a live RUC Program in the Nation.

Program Approach and Design:[2] Utah's RUC system is a voluntary program that alternative fuel vehicle owners may opt into at the time of their annual registration renewal, instead of paying a flat fee. In the program:

- Participants sign up with a third-party account manager who collects and reports miles driven, using in-vehicle technology they provide.

- Participants place a credit card on file and set up a pre-paid wallet from which mileage fees are deducted periodically.

- Payment of the per-mile fee stops once the accumulated total for the year is equal to the annual flat fee.

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[2] The description of Utah's Road Usage Charge Program is taken from:
https://www.udot.utah.gov/main/uconowner.gf?n=5891845694494866

- The account manager will provide several options for mileage data reporting, including smartphone apps, in-vehicle telematics, Bluetooth on-board diagnostic devices (using vehicles' OBD II ports), and odometer capture technology.

- People with privacy concerns may opt for limited data retention or pay the flat fee.

More information is available at: https://www.udot.utah.gov/main/f?p=100:pg:0:::1:T,V:5090.

Status: An advisory committee was created to advise development of Utah's RUC system. This committee represented State entities such as UDOT, DMV, and Legislature—as well as rural, environmental, privacy, taxpayer, business, and trucking interests. The full committee met three times to review proposed system elements and offer input. Committee subgroups met numerous times to explore specific topics, including privacy and security, data collection, compliance and enforcement, communications, and policy.

Utah passed Senate Bill 72, which allows the State to implement a RUC Program. This bill provided additional guidance for setup and administration of the RUC Program. It directed UDOT to create administrative rules related to various elements of the program, such as:

- Enrollment eligibility
- Enforcement
- Integration and data sharing with the DMV
- Privacy
- RUC rate setting

In May 2019, UDOT selected the French mobility services and technology provider, Emovis, as the commercial account manager to implement the road usage charge for an alternative fuel vehicles program. The UDOT and DMV have been working together with Emovis to start building a system interface that will link Emovis' enrollment process with the DMV's registration database.

Washington State

Funding and Objectives:

Fiscal Year	Amount Granted	Objective(s)
2016	$3,847,000	Test and evaluate a RUC system as an alternative to special license surcharges on plug-in electric vehicles; conduct the first test on the international interoperability of a RUC system between the United States and Canada; explore opportunities to leverage the capabilities of third-party enterprises to reduce mileage reporting costs; co-develop an RUC pilot in parallel with the deployment of the Washington Department of Licensing's new vehicle licensing information technology system; and carry out a "codefest" to develop an owner-controlled smartphone app to accurately report out-of-State mileage.
2017	$4,600,000	Carry out and evaluate a 12-month pilot that tests five concepts of mileage reporting to collect feedback from users regarding methods for assessing user fees, and to collaborate with other States to test and develop organizational and operational capabilities for implementing a RUC Program.
2018	N/A	N/A

Program Approach and Design: Washington's RUC Program predates the STSFA Phase I Project. In the spring of 2014, the Washington Legislature created a steering committee composed of business, government, nonprofit, and academic stakeholders to begin investigating a RUC that could replace the existing fuel tax. Later, in July 2016, the Washington State Transportation Commission set up a pilot project to test a RUC pilot program. The State applied for and obtained an STSFA Phase I grant to help supplement the cost of the pilot. Washington's RUC Program pilot proposed to test a flat mileage fee assessed from data collected through different methods. Specifically, the pilot offered five mileage tracking options: a mileage permit charge, self-reporting vehicle odometer readings, or an automated distance charge (calculated using either a plug-in telematics device with or without GPS or a smartphone app). The STSFA Phase I grant funded the final design and set up of a 12-month pilot, a public attitude assessment, evaluation planning and activities, recruitment of volunteers for the test pilot, and the execution of a smartphone innovation challenge. More information is available at https://waroadusagecharge.org/.

Status: Washington was able to complete all the activities funded by the Phase I grant. The State produced a ConOps for its pilot as well as other related documents, such as an interface control document and the system requirements specification document. To ensure a variety of

feedback, approximately 2,000 volunteers from diverse geographic and demographic groups participated in a 12-month pilot. Public attitude assessments (telephone surveys and focus group meetings) were also carried out and summarized in a report. Pilot project evaluation plans, such as participant surveys, participant focus groups, pilot data analysis, agency interviews, participant case studies, Scofflaw tests, policymaker interviews, and a steering committee-facilitated discussion were carried out for the purpose of addressing outstanding policy, public acceptance, and technical issues/questions. Finally, Washington carried out a smartphone innovation challenge event that used a crowdsourcing approach to build a smartphone app designed to be used in its RUC pilot. The app required that drivers have both the ability to use their own smartphone to record and report mileage and the ability to decide whether to enable location-based services.

Key Findings

Independent evaluations have been prepared for six of the STSFA demonstration programs based on their initial (Phase I) activities. Although all the STSFA demonstration projects are in their early stages, a synthesis of the early evaluation results has identified factors that are critically important for the success of RUC programs.

Data and Communications Security

Secure data management practices are critical for protecting driver privacy and addressing how system components collect, store, and transmit data. The STSFA demonstration programs documented key considerations for implementing secure MBUF programs. These include secure data storage, transmission and access, and privacy of the RUC system.

Although Washington State Transportation Committee felt privacy was protected in the Washington State RUC pilot, privacy and data security remained the top concerns of pilot participants. Washington found that data privacy measures made post-pilot analysis difficult for the project team. Although pilot participants granted approval that their data be used for analytical purposes only for the Washington RUC pilot project, the project team decided to implement protocols designed to shield the identity of participants and their driving data. The firewalls that were established for the pilot segregated personal information from driving data in a data breach. However, re-combining driving data, vehicle type and demographic characteristics to conduct the post-pilot evaluation proved more difficult than expected, resulting in a 2-week delay in reporting final driving and survey data.

Equity

Analysis-driven messaging around equity first involved identifying equity concerns of the stakeholders through engagement and outreach, and then analyzing impacts on target populations. Several grantee sites have begun the process of outreach through phone interviews, surveys, and focus group activities to ascertain perceptions of RUC among different demographic groups. Such outreach provides valuable insight into the potential concerns of the various stakeholders to RUC as a concept and specific approaches to fee structuring and collection.

Common themes regarding the perception of RUC being fair or equitable that have emerged with several pilot sites include the following:

- RUC may penalize people driving longer distances, particularly low-income drivers that are disadvantaged in being unable to afford to live in close proximity to work centers.

- RUC may penalize highly fuel-efficient vehicles, ignoring the environmental benefits such vehicles provide.

- RUC may penalize rural drivers who tend to drive longer distances than urban commuters.

To date, individual studies and analyses conducted by some of the pilot sites show that some of these concerns are not backed by data and that RUC will be no more regressive than the current fuel tax system. Additional studies would help bolster the case that an RUC can be an equitable form of transportation tax that puts into practice the principle of "user pays."

Public Acceptance

The 12-month Washington RUC pilot public surveys found that there were common themes expressed across all focus groups. Most participants are accepting of RUC and think it can work. Many participants felt the RUC amount was not too much to pay and relatively comparable to the gas tax. In general, most participants said that they still have little understanding of how transportation funding works, even after participating in the pilot for several months. A common concern raised was whether and how the system will work at a statewide scale. There were many questions about implementation and administration of a RUC Program. Ninety-one percent of test participants were satisfied or very satisfied. Forty-eight percent of pilot participants became more supportive. Participants were asked to set aside any fairness concerns they may have about impacts to others and express their own preference for a transportation funding method. The number of participants who preferred RUC over the gas tax grew by 10 percent from the beginning to the end of the pilot, and those who equally prefer RUC to the gas tax grew by 6 percent. By the end of the pilot test, 68 percent preferred RUC or found it on par with the gas tax as a transportation funding method.

Interoperability

Several of the STSFA demonstration programs have documented elements necessary for implementing MBUF programs across multiple States. These involve system architecture, data standards, mileage allocation, and institutional agreements. In May 2019, the Washington RUC steering committee received the results of the multi-jurisdictional RUC interoperability test conducted between Washington and the jurisdictions of Oregon, Idaho, and British Columbia. The pilot tested a new system designed by the project team for mileage reporting, payment and remittance back to the jurisdictions where the miles were driven. Drivers experienced seamless application of different per-mile rates assessed, depending upon where the miles were driven.

Programmatic Costs

The RUC/MBUF programs will have higher programmatic costs than do traditional fuel tax programs. The collection of motor fuel taxes at the Federal and State levels incurs extremely low costs. This is because fuel taxes are collected from a small number of refiners and distributors, who pass along those costs to fuel retailers and, ultimately, individual consumers. For example, nationally there are only about 850 registered taxpayers of Federal motor fuel taxes. Federal and State governments have no need to charge millions of vehicle owners. As a result, fuel tax administrative costs are generally estimated to be less than one percent of gross revenue.[3]

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[3] Congressional Research Service, 2016, *Mileage-Based Road User Charges*. CRS report R44540.

Findings from the STSFA pilot evaluations indicate that implementing MBUF will involve significant administrative effort. Tasks are likely to include education and outreach, certification and ongoing monitoring of account managers, changes to DMV operations and software to support system enrollment, and setting up appropriate enforcement structures.[4] In addition, most MBUF programs will have hardware, wireless communications, and data processing costs associated with mileage reporting. Initial estimates from STSFA pilots put total programmatic costs at 5 percent to 18 percent of gross revenue, although some costs may decrease over time as MBUF programs mature.

The STSFA pilot programs are exploring a variety of strategies for reducing costs. One approach considered by several of the pilots would use regional aggregation hubs (i.e., clearinghouses) to process mileage and payment data from individual vehicles, thereby significantly reducing the total number of collection points, and providing economies of scale. Another cost-control strategy would involve the use of contracted commercial account managers to handle MBUF administration, including transaction processing, payment collection, and account management. Account managers could potentially offset some costs by offering drivers additional services.

References

Congressional Research Service, 2016, *Mileage-Based Road User Charges.* CRS report R44540. Economic Development Research Group. Financial Impacts of Road User Charges on Urban and Rural Households. Western Road User Charge Consortium (RUC West) and Oregon Department of Transportation. Retrieved from https://www.edrgroup.com/pdf/FINAL-REPORT---Financial-Impacts-of-RUC-on-Urban-and-Rural-Households_Corrected.pdf International Fuel Tax Association, Inc. Revised January 2010. International Fuel Tax Agreement, Articles of Agreement. Retrieved from https://www.iftach.org/manuals/2010/AA/Articles%20of%20Agreement%20FINAL%20-%20January%202010.pdf Sethi, S., Pierce, B., Robbins, J., Van Duren, D., & Agrawal, A. W. July 2019. *Surface Transportation System Funding Alternatives Phase I Evaluation: Enhancing the Road Charge Pilot Program in California,* sponsored by the U.S. Department of Transportation, Federal Highway Administration, Washington, DC. Draft. Sethi, S., Pierce, B., Robbins, J., Van Duren, D., & Agrawal, A. W. July 2019. *Surface Transportation System Funding Alternatives Phase I Evaluation: Exploring a Mileage Based User Fee in a Multistate Region – Delaware and I-95 Corridor Coalition*, sponsored by the U.S. Department of Transportation, Federal Highway Administration, Washington, DC. Draft.

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[4] A related concern expressed is that because individual road-use charges are likely to be relatively small, collection actions for nonpayment may not be cost-effective.

Sethi, S., Pierce, B., Robbins, J., Van Duren, D., & Agrawal, A. W. July 2019. *Surface Transportation System Funding Alternatives Phase I Evaluation: Pre-Deployment Activities for User-Based Fee Demonstration by the Minnesota Department of Transportation (MnDOT)*, sponsored by the U.S. Department of Transportation, Federal Highway Administration, Washington, DC. Draft.

Sethi, S., Pierce, B., Robbins, J., Van Duren, D., & Agrawal, A. W. July 2019. *Surface Transportation System Funding Alternatives Phase I Evaluation: Pre-Deployment of Innovative Revenue Strategies and Public Outreach by Missouri Department of Transportation*, sponsored by the U.S. Department of Transportation, Federal Highway Administration, Washington, DC. Draft.

Sethi, S., Pierce, B., Robbins, J., Van Duren, D., & Agrawal, A. W. July 2019. *Regional Road Usage Charge System Definition and Pilot Planning Project by the Western Road Usage Consortium,* sponsored by the U.S. Department of Transportation, Federal Highway Administration, Washington, DC. Draft.

Sethi, S., Pierce, B., Robbins, J., Van Duren, D., & Agrawal, A. W. July 2019. *Surface Transportation System Funding Alternatives Phase I Evaluation: Road Usage Charge (RUC) Pilot by the Washington State Transportation Commission*, sponsored by the U.S. Department of Transportation, Federal Highway Administration, Washington, DC. Draft.

U.S. Department of Transportation. ITS DataHub, Intelligent Transportation Systems. Retrieved from https://www.its.dot.gov/data/index.html

U.S. Department of Transportation, Federal Highway Administration. About the Secure Data Commons Portal. Retrieved from https://its.dot.gov/data/secure/about.html

Utah Department of Transportation. January 2019. Utah's Road Usage Charge Program. Retrieved from https://www.udot.utah.gov/main/uconowner.gf?n=5891845694494866