RUC AMERICA

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TEN-YEAR STRATEGIC PLAN

FOR THE IMPLEMENTATION OF ROAD USAGE CHARGING

WSP

Revision History

Final Approval: December 8, 2022
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1 EXECUTIVE SUMMARY

RUC America and its member states are advancing the research, development, and demonstration of road usage charging (RUC) as an alternative to the motor fuels tax system. Recognizing how the inevitable transition away from liquid fuels will impact transportation revenue, RUC America planted the notion of moving away from a consumption based (fuel tax) system to a more equitable usage-based system, resulting in RUC.

The following plan provides a strategic roadmap for states to utilize as they navigate the multiple challenges associated with the implementation of an operational RUC program that fully transitions light-duty vehicles to RUC as the primary surface transportation revenue source.

In addition to the challenges of implementing RUC, there are also competing transportation priorities that will pull and tug on the transition over the course of the decade, including the need to raise new, sustainable revenue for a variety of infrastructure demands while balancing environmental, equity, and other social concerns. The Ten-Year Strategic Plan incorporates these challenges and priorities into a document which can be used immediately with executives and policymakers to lay out the road to a motor fuels tax transition.

The Ten-Year Strategic Plan moves beyond how to launch a RUC program, towards a phased approach which coexists and ultimately replaces the motor fuel tax revenue streams, termed the roadmap. It addresses the innumerable challenges associated with RUC programs and provides ways to evaluate three scenarios for launching and maintaining RUC operations.

1.1 FOUR PHASES OF DEVELOPMENT

The roadmap is divided in four phases, with each describing the specific challenges, decision points, and recommended actions.

Grants, as offered in Section 13001 of the Infrastructure Investment and Jobs Act (IIJA) can help fund both RUC pilots and may help further familiarity and public buy-in; as well as fund the capital expenses necessary to implement legislatively authorized programs. Prior to the program development, a period of **pre-implementation** is needed to build public support, pass authorizing legislation, and define the rate of the operational RUC program's expansion.

Below is a list of policy enactment goals for the pre-implementation phase. These goals represent the critical path to success during this phase and should be implemented through additions to the policy framework, presumably through administrative rulemaking

either at the legislative, executive, or agency level, within the years immediately preceding the deployment of the operational RUC program.

- **Goal #1:** The creation of a policy that establishes dates, targets, and benchmarks for the rate of program expansion by identifying which vehicles (pre-determined by MPG bands) will be enrolled in the operational RUC program and ensuring the orderly and efficient migration of vehicles.
- **Goal #2:** The creation of a policy that identifies and determines the appropriate state agency to assume programmatic responsibility and set the rate of programmatic staffing and resource growth through targets and benchmarks which will result in well-resourced agencies.
- **Goal #3:** The creation of a policy that defines the establishes dates, targets and benchmarks for the establishment of administrative office(s) and the coinciding staffing levels needed to operationalize the RUC program as it evolves through each phase and ensures appropriate staffing levels for efficient program delivery.
- **Goal #4:** The creation of a policy that defines and outlines the appropriate enforcement policies based upon statutory limitations and standard practices to ensure the mitigation of lost revenue through evasion.
- **Goal #5:** The creation of a policy that identifies targets and benchmarks for acceptable costs associated with the operations and administrations of the operational RUC program that will ensure efficient and cost-effective administration.
- **Goal #6:** The creation of a policy that Identifies the appropriate state and federal equity policies that may affect RUC program design and ensure the consideration of additional equity impacts following the deployment of RUC through continuous monitoring and reporting.

Once the operational RUC program has secured legislative sponsorship and authorizing legislation has passed and executive branch approval has been issued, state agencies are provided with the mandate to implement the RUC program. During the **Development Phase**, the lead agency's executive leadership and technical staff will be asked to support the rapid development of RUC operations, and the RUC program will contain all the features necessary to operate and collect revenue from a subset of vehicle classes.

Below is a list of policy enactment goals for the development phase. These goals represent the critical path to success during this phase and should be established in years 1-2 of deployment of the operational RUC program.

- **Goal #1:** The creation of a policy that establishes basic privacy and data protection requirements, assesses the achievement of privacy and data protection requirements against contractual language and demonstration of compliance, and provides non-location specific mileage reporting options to taxpayers.
- **Goal #2:** The creation of a policy that evaluates standardization protocols for private sector devices and systems and develops certification standards for review and documentation to ensure consistency and quality within the operational RUC program.
- **Goal #3:** The creation of a policy that leverages vehicular data, incorporates vehicular data requirements into standards for compliance, and encourages the adoption of national standards which require digital mileage type vehicle access be provided or available to consumers.
- **Goal #4:** The creation of a policy that acknowledges relevant legislation and statutory language related to fee and tax collection authority and identifies restrictions and limitations for state agencies to partner with the private sector for payment services to ensure that payments systems can support collections.

Moving into the **Operational Phase**, the mature RUC program conducts consistent and standardized processes. The roles of the lead and supporting agencies are well defined, and work items have a process and set of expectations for resolving any challenges. During this phase the RUC program will expand exponentially, capturing most of the passenger vehicle fleet, and achieve normalized operations, formalized programmatic activities, efficient cross-agency interaction, and institutional knowledge within the lead agency.

Below is a list of policy enactment goals for the operational phase. These goals represent the critical path to success during this phase and should be established in years 3-4 of the operational phase.

- **Goal #1:** The creation of a policy that evaluates data collection mechanisms and documents a transparency protocol to ensure data accuracy.
- **Goal #2:** The creation of a policy that institutes auditing requirements and outreach to relevant state agencies as part of policy development prior to system design that ensures sufficient staffing levels for consistent audit rates.

As technology advances, states are confronted with the increasing demands of an evolving transportation system, and that includes the key components and procedures surrounding the conduct of the RUC system. If the tolling industry provides any foundation of understanding, agencies should prepare for system replacement every decade, especially as vehicle manufacturers increasingly standardize RUC within onboard telematics. These advancements will require states to remain flexible and adaptable during the **Evolution Phase**.

Below is a list of policy enactment goals for the evolution phase. These goals represent the critical path to success during this phase and should be established in the early years of the evolution phase.

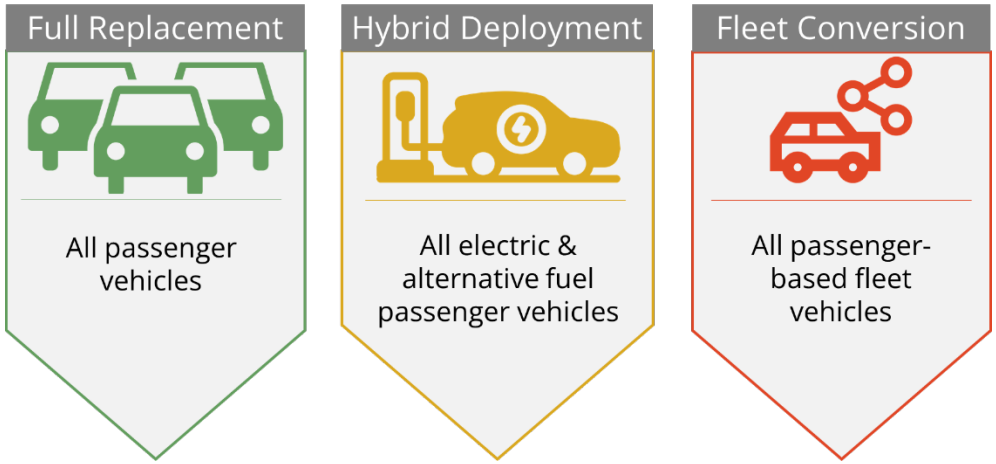
- **Goal #1:** The creation of a policy that requires the incorporation of flexibility into subsequent RUC implementations and explicitly highlights flexibility for technological evolution in technical specifications and business requirements to ensure future technologies can be incorporated into the operational RUC program.
- **Goal #2:** Data Standards: The creation of a policy that requires the incorporation of standards at the onset of systems design and allows for consistent updates to allow for an ongoing evaluation of the technology market and ensure that standards are updated as necessary based on changes in technology.
- **Goal #3:** National Interoperability: The creation of a policy that requires ongoing considerations for regional national interoperability that ensures the incorporation of interoperability into technical and business requirements during system design and beyond.

1.2 THREE SCENARIOS FOR TRANSITIONING TO RUC

Over a ten-year timeframe, several action items, across multiple categories, will determine the efficiency and effectiveness of the eventual RUC program, agnostic of the implementation scenario. The categories of actions include strategy and goals, policy and equity, technology, communications, revenue impacts, and organizational administration. In evaluating these actions, the report considers three distinct scenarios for implementation that are meant to guide public sector entities as they anticipate RUC implementation over a ten-year time frame.

The **Full Replacement** scenario replaces the motor fuels tax with RUC all at once and for all passenger vehicles. The **Hybrid Deployment** scenario deploys RUC for all electric, hydrogen, biofuel, and natural gas-powered vehicles. Under this scenario it is assumed that the motor fuels tax would remain in place for all gasoline or diesel vehicles. Finally, the **Fleet Conversion** scenario applies

RUC initially to fleet vehicles, such as transportation network companies (TNCs), taxis, rental vehicles, and light duty delivery vehicles, before ultimately migrating to all vehicles at the end of ten years.



1.3 OBSERVATIONS AND CONCLUSIONS

Through the development of the Ten-Year Strategic Plan, several key conclusions pertain to states' abilities to transition to RUC:

- **Variability Among States**: Due to varying political sensitivities, economic impacts, and socioeconomic differences amongst populations, there is not a single path for each state to take with regard to deploying an operational RUC program.
- **The Need for Standards**: National standards, from recognized standards bodies (e.g. SAE, NIST, etc.) will be necessary to achieve interoperability amongst states.
- **Public Outreach and Education**: Public outreach and education will be essential, especially when establishing a common understanding of the current funding model and why it is no longer sustainable.
- **Dispelling Common Myths**: Common myths associated with RUC, such as privacy implications, administrative complexities, high operating costs, and rural/urban equity can be easily addressed through education.
- **Role of the State DOT**: The role of the DOT may initially be as key administrators for operational RUC programs, but the final role will be determined based upon the best solution for each state.
- **Start with Electric and Highly Fuel-Efficient Vehicles**: Electric and other highly fuel-efficient vehicles are an obvious first choice for initial implementation of an operational RUC program, but states should also explore how and when to best integrate other vehicle classes.
- **RUC Rates**: RUC rates can apply uniformly to all passenger vehicles or could vary based on vehicle weight, emissions, or fuel economy depending on a state's policy priorities.

- **Legislative Engagement**: Strong working relationships with legislators across multiple parties and special interest groups is necessary to obtain legislative approval for RUC.
- **The Role of the Federal Government**: Guidance from the national RUC pilot program will play a key role in determining how states will deploy their own RUC solutions.
- **Commonly Used Terms**: There are a variety of terms used when discussing the concept of RUC as a distance-based fee strategy. These include mileage-based user fees (MBUF), distance-based fees (DBF), and vehicles miles traveled (VMT) fees. Each of these terms is referencing the same concept of RUC, but simply using a different name.
- **Regional Interoperability**: Regional interoperability is necessary and IFTA provides a model for states to consider due to its adherence to common standards which allow for consistency in interstate revenue reciprocity.
- **Experience Breeds Acceptance**: With RUC, experience breeds acceptance. States who have previously deployed public-facing pilot programs are more likely to garner stronger public acceptance of RUC.

2 RUC: NEW PATHS TO ROAD FUNDING

State transportation agencies are at a crossroads. It is clear that electric and other alternative fuel vehicles, coupled with ever greater efficiency in internal combustion engines, have exponentially increased in popularity over the past several years. This increase in electric and alternative fueled vehicle popularity, who in most RUC America states do not pay a proportionate share for road use, poses a direct reduction in revenues derivative from motor fuel taxes, which comprise the largest percentage of revenue raised for roadway safety, maintenance, and efficiency.

In 2015, the National Renewal Energy Laboratory indicated that increases in fuel efficiency would lead to a "fuel tax revenue decrease by $57 billion by 2022."[1] In the same time period, Tesla's electric vehicles (EV) went from 0.11% to 6.59% (March 2015 – March 2022) market share of total U.S. vehicle sales. In California alone, almost half a million new EV registrations occurred in 2021, as shown in **Figure 1**.[2]

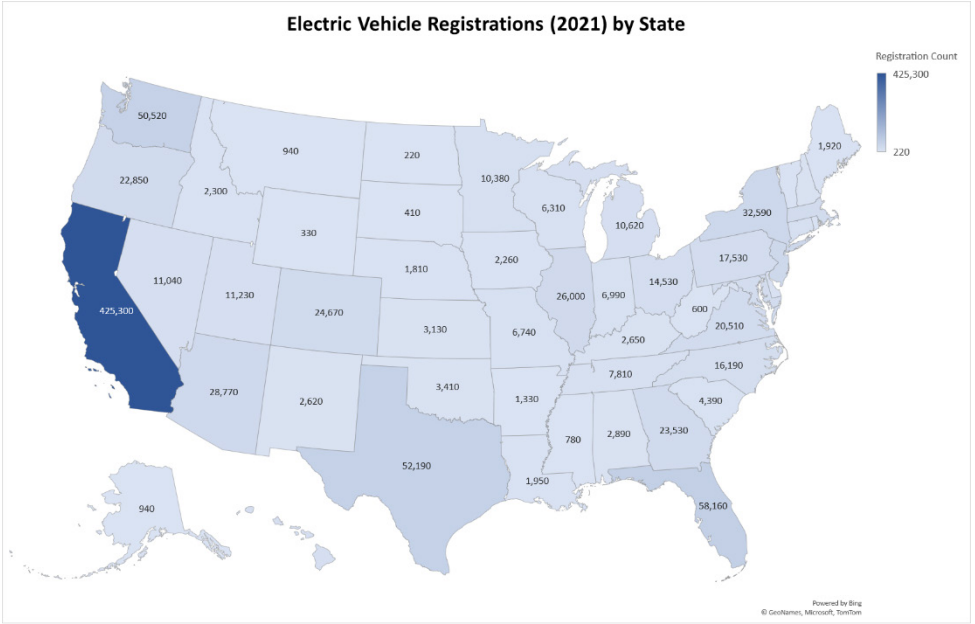


Figure 1: Electric Vehicle Registrations by State, U.S. Department of Energy, 2021

If the anticipated reduction in motor fuel tax revenue is not already here, then it is certainly coming up the driveway.

[1] National Renewable Energy Laboratory. *A Primer on Motor Fuel Excise Taxes and the Role of Alternative Fuels and Energy Efficient Vehicles*, U.S. Department of Energy, September 2015.

[2] U.S. Department of Energy. *Electric Vehicle Registrations by State*, 2021. https://afdc.energy.gov/data/

2.1 RUC AMERICA HAS A SOLUTION

RUC America and its member states are nationally recognized as leaders in advancing the research, development, and demonstration of road usage charging (RUC) as a potential alternative to the motor fuels tax system. Knowing what overall transportation revenue looks like in the years ahead, RUC America is exploring strategies that allow states to consider deploying the more flexible, sustainable, and future-ready funding model of RUC.

The purpose of RUC America is to elevate public sector knowledge and understanding through cooperative, pool funded research. RUC America has actively researched such issues as technical research and development, legal and policy issues, fiscal and economic implications, standards and certification, administrative and operational challenges, inter-jurisdictional concerns, stakeholder outreach and communications, and platforms and operations for state or regional pilots.

RUC America and its member states are currently leading the nation in the implementation of RUC as a next-generation funding source. From research studies to successful pilot demonstrations to operational RUC revenue programs, RUC America is truly blazing "New Paths to Road Funding."

RUC America member states are organized into three tiers based on their current level of involvement in advancing RUC in their jurisdiction (**Figure 2**):

- Tier 1 – States with implemented RUC programs (Blue)
- Tier 2 – States testing RUC pilot programs (Green)
- Tier 3 – States researching RUC (Gray)

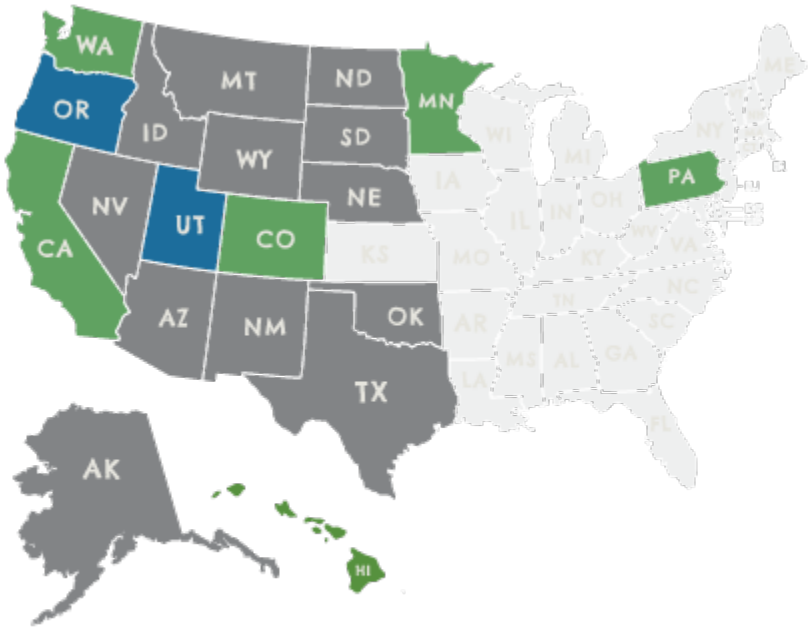


Figure 2: RUC America Member States by Tier, RUC America, 2022

2.2 WHY DO WE NEED ROAD USAGE CHARGING?

RUC is a transportation funding mechanism that enables drivers to support road and highway maintenance by paying a fee on each mile they drive, rather than a per-gallon surcharge for each gallon of fuel they purchase. Drivers with highly fuel efficient or electric vehicles pay less to use the roads, whereas those with low fuel efficiency vehicles pay more. By comparison with RUC, drivers pay a predetermined per-mile fee based on the distance they travel. All vehicles – no matter how much or how little fuel they consume – will pay an equitable share for the use of roads.

The current motor fuels tax system will return declining revenues due to increased fuel economies and fuel diversification. Additionally, the limited revenue that is collected from fuel taxes will continue to lose value due to the steady declination of overall purchasing power, and higher construction costs:

FUEL TAX SUSTAINABILITY

Since the Federal fuel tax was last raised in 1993, vehicles have become much more fuel efficient which has led to declining revenues. There has been an increase in average vehicle fuel efficiency from 21 miles per gallon (mpg) to 25 mpg in 2020.[3] Vehicles are contributing less in fuel taxes per mile to offset the wear that driving each mile produces.

FUEL DIVERSIFICATION

In recent years, several alternative fuels have been introduced with little to no tax structures to support transportation infrastructure investments. According to the RUC West 2018 Report on *Financial Impacts of Road Usage Charges on Urban and Rural Households*, less than 10% of all vehicle miles traveled (VMT) in RUC America states occurs with non-gasoline-based vehicles.[4]

PURCHASING POWER

Since 1993, the last time the Federal fuel tax was raised, the purchasing power of the dollar has declined steadily. The US dollar in 2021, before 2022's high inflation, held only 46.7% the purchasing power it did in 1993.[5] This trend will likely continue and escalate in the short term.

[3] U.S. Environmental Protection Agency. *Highlights of the Automotive Trends Report: New vehicle estimated real-world CO2 emissions are at a record low and fuel economy is at a record high*, November 2021. https://www.epa.gov/automotive-trends/download-automotive-trends-report

[4] RUC West. *Financial Impacts of Road Usage Charges on Urban and Rural Households*, RUC West, 2018.

[5] U.S. Federal Reserve Bank of Minneapolis. *Consumer Price Index, 1913 to Current*, 2022.

2.3 TEN-YEAR STRATEGIC PLAN FOR RUC

The collaborative nature of RUC America, coupled with institutional knowledge of, and investment in, RUC, make it the prime coalition to create a ten-year implementation plan for all light duty vehicles. RUC America represents states across a broad geographic spectrum. RUC policies, strategies, and administrative and technical solutions must account for the variability in how each state operates. At the same time, certain consistencies and commonalities are necessary (e.g., basic technologies and associated standards, providing economies of scale for the private sector, policies regarding travel in other states) to most effectively enable a multi-state approach that will eventually lead to full-scale RUC implementation.

RUC America selected a ten-year period assuming RUC programs become more ubiquitous through pooled-fund studies, grant programs like those in IIJA, and additional pilot studies to increase public familiarity and raise awareness. Further, an exponential increase in electric vehicle sales is expected over the next several years as states begin to implement their clean air initiatives, expand EV charging infrastructure, and new EV battery technology is released. Because of these factors, it is anticipated that within the next ten-years, several new states will be deploying their own legislatively authorized RUC programs, building off the successes of legislatively authorized programs in Oregon, Utah, and Virginia.

Recognizing that each of their member states had varying levels of interest, processes, and policies in launching a RUC program that could tackle the challenges of the motor fuel tax revenue decline, RUC America decided to create a Ten-Year Implementation Plan to advise their member states as they explore implementing their RUC programs. This implementation plan serves as a guide, regardless of RUC maturity level, political appetite for RUC, or Tier level within RUC America.

This implementation plan aims to provide high-level steps, recommendations, and best practices for states to engage when advancing through the RUC America tiers and implementing their own RUC programs. As each state has their own unique processes, policies, and administrative rules, the recommendations provided in this implementation plan should be customized to best fit each state's unique operating environment.

The implementation plan provides guidance across several key focus areas including Policies, Public Acceptance, Technology, Equity, and Administration. Additionally, this report identifies many of the challenges that states may experience when advancing across RUC maturity tiers and when they begin deploying, operating, and administering their RUC programs. While the plan provides recommendations for deploying RUC programs, they should each be evaluated against existing state policies and plans to ensure that the execution of the recommendations neither conflicts with existing policies nor detracts from other higher priority strategic initiatives in each state.

2.4 GOALS AND OBJECTIVES

Given multiple state perspectives, this report establishes common goals and objectives that comprise the Ten-Year Implementation Plan:

1	**Comprehensive and Useful Information**	The information contained in this Implementation Plan should be both comprehensive enough for RUC America states to leverage when considering and deploying RUC programs, as well as useful enough for them to customize for their own unique applications.
2	**Ten-Year Timeframe**	The processes and recommendations should be able to be completed in a Ten-Year timeframe, assuming there is adequate political will to deploy a RUC program.
3	**Off-Ramps for States**	This Implementation Plan should clearly establish steps and phases where states can pause and revisit activities without experiencing a significant setback to their overall RUC program goals.
4	**Agnostic to Tier Level**	Information presented in this plan should be easily understood and accepted by states regardless of their Tier within RUC America. The information provided should competently explain how to deploy RUC in a state, while providing it in a way that all states can easily understand and accept.
5	**Adaptable and Scalable**	The provided processes and recommendations are intended to be customizable by each member state. While the core processes and recommendations should remain intact, they should also be easily adaptable by states and useful for each state's unique situations.
6	**Realistic Guidance**	The recommendations are based on key inputs from each RUC America state, as well as best practices from other RUC deployments, and should provide an accurate, reliable, and defensible path to states to launch their own respective RUC programs.

2.5 IMPLEMENTATION AND TRANSITION PHASES

The following sections detail the challenges and barriers associated with implementing an operational RUC program, as well as articulate a structured roadmap over a 10-year period. There are multiple challenges that must be overcome to fully transition light duty vehicles to RUC as the primary surface transportation revenue source. The following Ten-Year Implementation Roadmap is intended to assist states as they develop their operational RUC programs. The roadmap is divided in four phases, with each describing the specific challenges, decision points, and recommended actions:

In addition to the challenges of implementing RUC, there are also competing transportation priorities that will pull and tug on the transition over the course of the decade, including the need to raise new, sustainable revenue for a variety of infrastructure demands while balancing environmental, equity, and other social concerns. This Ten-Year Plan incorporates these challenges and priorities into a document which can be used immediately with executives and policymakers to lay out the road to a motor fuels tax transition.

3 PRE-IMPLEMENTATION PHASE

Prior to the program development, a period of **pre-implementation** is needed to build public support, pass authorizing legislation, and define the rate of the operational RUC program's expansion. The following are a list of steps, decisions, and recommendations for the pre-implementation phase. This phase is oriented for those RUC America states who have decided to actively develop and implement a RUC program. Unless stated otherwise, this would be oriented towards states achieving Tier 2 or 3.

Below is a list of policy enactment goals for the pre-implementation phase. These goals represent the critical path to success during this phase and should be implemented through additions to the policy framework, presumably through administrative rulemaking either at the legislative, executive, or agency level, within the years immediately preceding the deployment of the operational RUC program.

- **Goal #1:** The creation of a policy that establishes dates, targets, and benchmarks for the rate of program expansion by identifying which vehicles (pre-determined by MPG bands) will be enrolled in the operational RUC program and ensuring the orderly and efficient migration of vehicles.
- **Goal #2:** The creation of a policy that identifies and determines the appropriate state agency to assume programmatic responsibility and set the rate of programmatic staffing and resource growth through targets and benchmarks which will result in well-resourced agencies.
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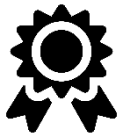
- **Goal #6:** The creation of a policy that Identifies the appropriate state and federal equity policies that may affect RUC program design and ensure the consideration of additional equity impacts following the deployment of RUC through continuous monitoring and reporting.

3.1 PUBLIC ACCEPTANCE

Building public acceptance for RUC is a priority consideration for state agencies. Research has consistently shown that the public knows little about how transportation programs are funded or how much they pay in transportation fees and taxes. Nor do they realize there is a problem with the fuel tax. Without this foundation, the public resists the imposition of any perceived new fees without clear articulation for what purposes those fees are imposed. Although RUC policies are challenged with public acceptance, states need not wait until mass acceptance has been gained to move toward implementation.

ACTIONS

1) Baseline public opinion and understanding research
2) Advance market research on salient user and stakeholder topics for RUC
3) Outreach and education about the existing transportation funding system[6]
4) Proliferation of grants and studies that demonstrate the need for an alternative funding source to supplement the fuel tax.



RECOMMENDATION

Conduct public opinion research (polls, surveys or focus groups). This enables the development of outreach and education materials tailored to the knowledge base and interests of the citizens in each state.

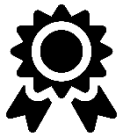
[6] *It should be acknowledged some DOTs may be restricted from conducting public information campaigns as they may be seen as a form of lobbying.*

3.2 RATE OF PROGRAM EXPANSION

The scope of transferring a state's entire passenger vehicle fleet to an operational RUC program within ten years looms large. However, prior to implementation, the development of targets that outline a state's plan for the migration of the passenger vehicle fleet will serve as a guide with benchmarks that yields full implementation.

ACTIONS

1) Decide which elements of the fleet will be migrated in the operational RUC program
2) Investigate use of miles-per-gallon bands and alternative fuel systems to determine which vehicle classes are enrolled in the operational RUC program and when.
3) Explore how the state's revenue, sustainability, and equity goals are impacted by different policy considerations including (but not limited to): operational features, technologies, rate schedule, enforcement practices, enrolled vehicle classes, socioeconomic factors of enrollees, and geographic boundaries.
4) Identify state systems, staffing, and policy needs that will need updating or augmenting when transitioning to a RUC.



RECOMMENDATION

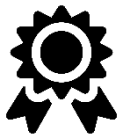
Develop vehicle enrollment targets that show how passenger vehicles can be migrated within ten years, including the use of miles-per-gallon bands in setting targets. To balance equity and revenue requirements, states should start with the most fuel-efficient, alternative-fuel, and electric vehicles and then, if the need is still there, explore migrating to less fuel-efficient passenger vehicle classes.

3.3 ORGANIZATIONAL STRUCTURE

The diversity of state governance structures likewise yield diversity in RUC organizational structures. During the Development Phase, or perhaps at earlier phases depending on the affected state, several decision points will affect the efficiency and approach to a state's RUC program rollout.

ACTIONS

1) Identify the lead state agency that assumes programmatic responsibility
2) Determine the anticipated rate of programmatic staffing and resource growth
3) Balance organizational structures around the state's prevailing perspectives on the size and scope of agencies and private contractors



RECOMMENDATION

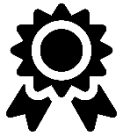
Early in the process, state decision-makers should determine the leading state agency that will oversee the program. Once established, each agency's (lead and supporting) roles and responsibilities can be identified and fulfilled. Depending on the rate of program growth and prevailing state practice, private-sector support may be needed, potentially until the proper organizational and staffing changes can be made.

3.4 COSTS OF COLLECTION

RUC systems are inherently more complex and thus potentially costly to collect relative to other transportation funding approaches. Agencies must demonstrate (to elected officials, stakeholders, and the public) that they can be collected cost-effectively. A common strategy for lowering collection costs is to leverage private sector account managers, but this requires the necessary institutional support and statutory authority for contracting with or certifying private partners for fee and tax collection.

ACTIONS

1) Identify viable public sector collection points and opportunities in conjunction with policy development for pilot demonstrations



RECOMMENDATION

Identify processes and associated costs for operating and administering other state fees such as vehicle registrations, vehicle inspections, tolling, etc.

3.5 ENFORCEMENT

(All Tiers) RUC systems represent a shift away from the relatively easy to enforce fuel tax system (where fuel distributors are responsible for payment) to one where drivers are likely to be liable for fee payment. As with administrative and collection costs, enforcement can be shifted to the private sector by relying on private account managers. However, there is still likely to be a need for state-based enforcement strategies, namely by linking RUC enforcement with vehicle registrations and the denial of renewals for failure to pay.

ACTIONS

1) Determine appropriate enforcement policies, based upon statutory limitations and standard practices

RECOMMENDATION

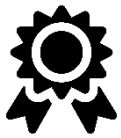
States will have to determine the level of enforcement policies that are appropriate for their populations. Passive forms of enforcement include the withholding of annual vehicle registration, with proactive forms using state and local law enforcement to issue citations for lack of compliance. It is recommended that states use annual registration holds for non-compliant RUC payers in the early stages of RUC program development. Once the RUC program is established and users are aware of the program, more advanced forms of enforcement (e.g., state and local law enforcement citation practices) can be deployed.

3.6 ADMINISTRATIVE COSTS

(All Tiers) As with collection costs, administrative costs are likely to change with the implementation of a RUC system. These costs can be minimized by leveraging existing state resources for tax and fee administration. However, this will require coordination with relevant state agencies, such as departments of motor vehicles, at the early stages of policy development and pilot design.

ACTIONS

1) Engage other state agencies which collect fees (e.g., motor vehicles, revenue, etc.)
2) Engage regional / local partners who collect fees (e.g., toll operations, transit, etc.)
3) Identify processes and associated costs for operations and administrations



RECOMMENDATION

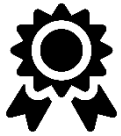
The efficiency of collection and administrative costs associated with motor fuels tax is likely not to be replicated by any alternative funding mechanism. However, through interagency coordination and economies of scale, administrative cost will likely decline substantially. In the near term, states will be asked to decide their tolerance for administrative costs.

3.7 EQUITY CONSIDERATIONS

A RUC system is likely to shift the burden of transportation funding among different user groups. Agencies will have to demonstrate that the new funding approach is fair if it is to be successful. However, perceptions of fairness and equity differ significantly among user groups. As such, states will need to invest in equity analysis and equity outreach activities as an initial step in system develop. Furthermore, equity considerations are a primary consideration for federal programs and will need to be addressed as part of future federally funded initiatives.

ACTIONS

1) Engage state and federal champions to define equity considerations
2) Identify appropriate state and federal equity policies that may affect RUC program design
3) Consider additional equity impacts following deployment of RUC



RECOMMENDATION

Identify equity groups and establish relationships with relevant stakeholders or interest groups. Establish relationships with universities to analyze policy options to assess likely equity impacts.

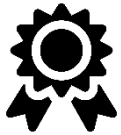
Build off of previous rural/urban impact studies by RUC West, the Eastern Transportation Coalition, academia, and state impact studies and focus group/community meeting studies.

3.8 LEGISLATIVE ENGAGEMENT AND AUTHORIZATION

Agencies can generally conduct RUC research without requiring much in the way of legislative approval or oversight. However, many legislators will be unwilling to invest political capital in support of RUC system development, particularly given the initial lack of support for the concept among the public. Engagement with legislators is, therefore, necessary to educate them on the concept and solicit their input for policy development and subsequent pilot system design. Pilots have been conducted without enabling legislation, but there is no guarantee action will be taken by policymakers following the close of demonstration activities. Authorizing legislation provides a framework for state agencies to conduct their research and how results are to be used. Regardless, legislation will be required for any subsequent implementation beyond a pilot demonstration.

ACTIONS

1) Determine the preferred method of administrative rulemaking (legislative, executive, agency) to govern RUC programs
2) Engagement with legislators prior to pilot design
3) Provide legislators with opportunities to participate in RUC pilots (state or regional)



RECOMMENDATION

Work with state legislatures to establish task forces, committees, and other legislatively sanctioned entities to establish the rationale for RUC implementation, provide initial policy guidance, and develop pilot concepts. Develop broad agency authority to execute legislative mandates for RUC, including rulemaking decisions crafted by policy experts with in-depth knowledge of RUC.

4 DEVELOMENT PHASE (1-2 YEARS)

Once the operational RUC program has secured legislative sponsorship and authorizing legislation has passed and executive branch approval has been issued, state agencies are provided with the mandate to implement the RUC program. During the **Development Phase**, the lead agency's executive leadership and technical staff will be asked to support the quick development of RUC operations. The key challenges and decision points of this phase are listed below. Unless stated otherwise, this would be oriented towards states achieving Tier 2 or 3 (Section 2.1).

Below is a list of policy enactment goals for the development phase. These goals represent the critical path to success during this phase and should be established in years 1-2 of deployment of the operational RUC program.

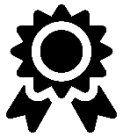
- **Goal #1:** The creation of a policy that establishes basic privacy and data protection requirements, assesses the achievement of privacy and data protection requirements against contractual language and demonstration of compliance, and provides non-location specific mileage reporting options to taxpayers.
- **Goal #2:** The creation of a policy that evaluates standardization protocols for private sector devices and systems and develops certification standards for review and documentation to ensure consistency and quality within the operational RUC program.
- **Goal #3:** The creation of a policy that leverages vehicular data, incorporates vehicular data requirements into standards for compliance, and encourages the adoption of national standards which require digital mileage type vehicle access be provided or available to consumers.
- **Goal #4:** The creation of a policy that acknowledges relevant legislation and statutory language related to fee and tax collection authority and identifies restrictions and limitations for state agencies to partner with the private sector for payment services to ensure that payments systems can support collections.

4.1 MOTORIST ENGAGEMENT AND ENROLLMENT

(All Tiers) Initial program deployment requires engagement with future program participants to ensure they know how to enroll, their responsibilities, and their options for assessment and reporting. These efforts will need to be maintained throughout the course of the program, particularly as the program expands to include new vehicle classifications.

ACTIONS

1) Establish the rate of program growth
2) Create key performance indicators (KPI) for RUC program goals and objectives
3) Assess KPIs with the level of motorist engagement and enrollment



RECOMMENDATION

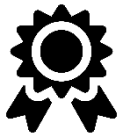
Based on the rate of program growth, the urgency of engagement and enrollment will vary amongst states. Motorist engagement and enrollment should be closely tied with the public education and acceptance efforts included in the communications plan.

4.2 PRIVACY PROTECTION

Privacy concerns are likely to be a significant concern for system users, even though those concerns are likely to differ from user to user. Some will have little to no problem with the collection and transmission of road usage data. In contrast, others will view the collection of any data whatsoever as an unacceptable intrusion and overreach by the state. Successful RUC systems will need to address privacy concerns as an initial step in public outreach and communications and will need to demonstrate the privacy protection and data security requirements have been thoughtfully addressed as part of policy development and system design.

ACTIONS

1) Establish basic privacy and data protection requirements
2) Assess the achievement of privacy and data protection requirements against contractual language and demonstration of compliance
3) Provide non-location specific mileage reporting options to taxpayers



RECOMMENDATION

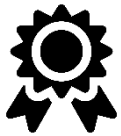
Confirm the relevant privacy laws and data protection requirements in the state are reflected in program manuals and contractual language. States should consider the limitations placed on regional and national interoperability through the use of non-location specific mileage reporting options.

4.3 CERTIFICATION

RUC operations and account management are likely to be handled to varying degrees by private sector entities. These entities should be encouraged to develop new technology approaches for assessment; however, these new approaches must be shown to function properly and provide the appropriate data for program administration. Certification provides vendors a consistent, unbiased, and transparent approach for bringing new technology services to the RUC market. Furthermore, as the program grows and more vehicles are included, certification allows the state to easily bring new vendors to the system.

ACTIONS

1) Evaluate standardization protocols for private sector devices and systems (e.g., Society of Automobile Engineers, OmniAir, International Organization for Standardization)
2) Develop certification standards for review and documentation
3) Encourage federal adoption of established standards



RECOMMENDATION

Certification standards will signal to private sector entities the level of innovation and flexibility a state accept. Certification standards should be set to levels that correlate to the political realities of a given state, help meet the goals and objectives of the RUC program and protect the user's privacy while ensuring data security.

4.4 STAFFING

The need for staffing will largely depend on the extent to which RUC systems can be integrated within existing state resources for fee and tax collection and enforcement. For example, a RUC might be implemented as an alternative assessment and payment option for enhanced registration fees, in which case fee administration can largely be incorporated within existing vehicle registration systems. However, development of RUC as an alternative to fuel taxes or as a reporting option for new highway user fees may require the development of new information technology systems and new staffing.

ACTIONS

1) Following completion of a pilot, consider resource and staffing following the establishment of a basic administrative approach
2) Assess potential costs for various administrative approaches in policy and system development activities.

RECOMMENDATION

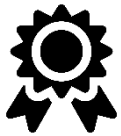
Document and analyze administrative effort and cost as part of initial pilot activities. Assess staffing requirements upon establishment of policy goals for the fee to be implemented (replacing existing fee, reporting option for new fee, etc.).

4.5 VEHICLE DATA

RUC systems require travel data for assessment. This data can be relatively minimal, such as a simple odometer reading, or complex involving geolocation. Regardless, it must be accurate and enforceable. Using data provided by the vehicle itself, either through on-board diagnostics or embedded telematics, is a highly accurate and relatively cost-effective method for determining distance traveled.

ACTIONS

1) Identify opportunities to leverage vehicular data
2) Incorporate vehicular data requirements into standards for compliance
3) Encourage the adoption of national standards which require digital mileage type vehicle access be provided or available to consumers



RECOMMENDATION

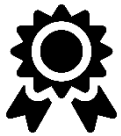
Assess the methods available for road usage assessment and evaluate relative to state privacy and data security requirements.

4.6 PAYMENT SYSTEMS

Variety and flexibility in payment options has been a key component of many successful pilots. The decision to offer a variety of payment system options will largely be driven by equity, privacy, and cost concerns. An additional, long-term, consideration will be the effect on regional interoperability and cross border travel. While the balancing of these concerns will vary from state to state, each consideration will likely play an important role in the final determination of payment system offerings.

ACTIONS

1) Identify relevant legislation and statutory language related to fee and tax collection authority
2) Identify restrictions and limitations for state agencies to partner with the private sector for payment services
3) Develop a payment system plan which includes procurement procedures and customer engagement



RECOMMENDATION

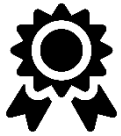
The state agency should develop a broad perspective on the implementation of payment systems from RUC customers. While only a few payment options may be supported upon initial implementation, the expansion of future options allows users to select the metering and assessment options they are most comfortable with. Agencies should consider the need to offer public agency-based payment options in addition to those that might be offered by the private sector.

4.7 DATA INTEGRATION

RUC pilots have shown that the platforms supporting assessment processes can be integrated with several other state and local data platforms for enhanced service provision. However, these systems will generally be found in other agencies operating under different and, in some cases unique, architectures. Thoughtful system design that accounts for potential integration ensures that RUC data architectures are flexible for future integration.

ACTIONS

1) Engage adjacent states and local / regional partners
2) Assess data sharing and integration needs
3) Identify future data integration needs, so as to inform current architecture
4) Consider data sharing's potential impact to the public's perception of the privacy of a RUC system, and whether it will undermine public confidence in a transition.



RECOMMENDATION

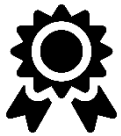
While it may seem like a longer-term consideration in the context of regional and national interoperability, early consideration of future data integration needs is a specific decision point for states. As such, the agency should identify potential integration opportunities with other state agencies and local/regional partners.

4.8 VEHICLE AND SERVICE-BASED PARTNERSHIPS

(All Tiers) RUC systems are likely to leverage partnerships with vehicle manufacturers, various mobility service providers, and other business models for assessment and account management. This represents a significant departure from the existing transportation funding system where fuel taxes are collected from a limited number of fuel distributors. As such, agencies should engage with these partners early in the policy and system development processes.

ACTIONS

1) Engage vehicle manufacturers and in-vehicle system providers
2) Incorporate technologies, processes, and key regulatory requirements in system design



RECOMMENDATION

Identify potential vehicle and service-based partners and evaluate agency authority to enter partnerships.

5 OPERATIONAL PHASE (3-7 YEARS)

The Development Phase established a RUC program that contains all the features necessary to operate and collect revenue from a subset of vehicle classes. Moving into the **Operational Phase**, the mature RUC program conducts consistent and standardized processes. The roles of the lead and supporting agencies are well defined, and work items have a process and set of expectations for resolving any challenges. During this phase the RUC program will expand exponentially, capturing most of the passenger vehicle fleet. However, as the refinement of the RUC program continues there are still challenges and decision points, discussed in the topics below. Unless stated otherwise, these topics would be oriented towards states achieving Tier 2 or 3 as defined in Section 2.1.

Below is a list of policy enactment goals for the operational phase. These goals represent the critical path to success during this phase and should be established in years 3-4 of the operational phase.

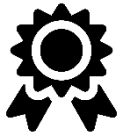
- **Goal #1:** The creation of a policy that evaluates data collection mechanisms and documents a transparency protocol to ensure data accuracy.
- **Goal #2:** The creation of a policy that institutes auditing requirements and outreach to relevant state agencies as part of policy development prior to system design that ensures sufficient staffing levels for consistent audit rates.

5.1 DATA ACCURACY

(All Tiers) RUC systems must be shown to be accurate if they are to be accepted by policy makers, stakeholders, and the public. Pilots conducted to date have shown that most of the technologies used for data collection and assessment are generally accurate. When deciding to make anonymized data accuracy information publicly available states must balance the benefits of programmatic transparency to build user trust versus the perception of privacy violations and the implications to data security.

ACTIONS

1) Evaluate data collection mechanisms
2) Develop and document a transparency protocol



RECOMMENDATION

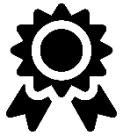
Programmatic transparency has been proven to instill trust with users, and future users, of RUC programs. The proactive display of data accuracy through a RUC program website, or public presentations, will ensure users that their data is being recorded accurately and resulting RUC charges which are fair.

5.2 DATA AUDITABILITY

RUC system and policy design should support a high degree of auditability to address concerns about accuracy and reliability. Thorough auditing processes ensure that data systems are functioning properly and that users are being charged the correct amount. Furthermore, auditing functions are necessary for enforcement activities and confirming that service providers are meeting their obligations.

ACTIONS

1) Develop auditing requirements
2) Outreach to relevant state agencies as part of policy development prior to system design
3) Ensure sufficient staffing levels for consistent audit rates



RECOMMENDATION

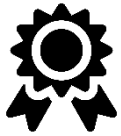
States should act to develop auditing requirements and oversight processes that will ensure transparency within the operational RUC program.

5.3 REGIONAL INTEROPERABILITY

Public acceptance research has shown a consistent preference among transportation system users for interoperable systems. Drivers fear that staggered implementation of RUC among the states will lead to a fragmented national system where users must enroll in different systems for interstate travel. A common set of standards, at the regional or national level, will be crucial to the success of interoperable systems.

ACTIONS

1) Coordinate with states, MPOs, and local and regional partners to define a set of common goals and needs for interoperability.
2) Correlate state, MPO, local, and regional needs with established federal standards.
3) Identify agencies and clearinghouses that are already practicing data and revenue interoperability to identify linkages and best practices (e.g. IFTA, Visa, EZ-Pass).
4) Create common minimum standards and data fields that create consistency among states for data transfers, funds transfers, reporting, and enforcement.



RECOMMENDATION

Work with adjacent states and local jurisdictions to identify data sharing, storage, and clearinghouse partnership opportunities.

6 EVOLUTION PHASE (8-10 YEARS)

During the Operational Phase, a RUC program achieves normalized operations, formalized programmatic activities, efficient cross-agency interaction and institutional knowledge within the lead agency. However, as technology advances, states are confronted with the increasing demands of an evolving transportation system, and that includes the key components and procedures surrounding the conduct of the RUC system. If the tolling industry provides any foundation of understanding, agencies should create resilient RUC systems that can accommodate new technologies that appear in the marketplace, especially as vehicle manufacturers increasingly standardize RUC within onboard telematics. These advancements will require states to remain flexible and adaptable during the **Evolution Phase**, while anticipating and planning for the following challenges and decision points. Unless stated otherwise, this would be oriented towards all tiers.

Below is a list of policy enactment goals for the evolution phase. These goals represent the critical path to success during this phase and should be established in the early years of the evolution phase.

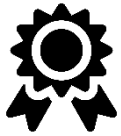
- **Goal #1:** The creation of a policy that requires the incorporation of flexibility into subsequent RUC implementations and explicitly highlights flexibility for technological evolution in technical specifications and business requirements to ensure future technologies can be incorporated into the operational RUC program.
- **Goal #2:** Data Standards: The creation of a policy that requires the incorporation of standards at the onset of systems design and allows for consistent updates to allow for an ongoing evaluation of the technology market and ensure that standards are updated as necessary based on changes in technology.
- **Goal #3:** National Interoperability: The creation of a policy that requires ongoing considerations for regional national interoperability that ensures the incorporation of interoperability into technical and business requirements during system design and beyond.

6.1 EVOLVING TECHNOLOGY

Technologies for collecting, processing, and transmitting road usage data will continue to evolve. In-vehicle telematics will improve as more systems are factory installed as a standard feature, and automated vehicle applications may one day be standard as well. RUC systems should be structured so that they facilitate, or are at least flexible to, technology innovation.

ACTIONS

1) Design early pilot applications with an eye to technological evolution.
2) Incorporate flexibility into subsequent implementations
3) Explicitly highlight flexibility for technological evolution in technical specifications and business requirements



RECOMMENDATION

Utilize requests for information (RFI) and events like vendor days to solicit input from potential system vendors and account administrators on how to structure technical requirements so they are flexible to evolving technologies. Coordinate with original equipment manufacturers and industry groups to identify standards and requirements that would be suitable for in-vehicle telematics incorporation. Ensure that certification requirements are updated constantly to industry best practices.

6.2 DATA STANDARDS

To the fullest extent possible, RUC systems should rely on standards-based designs. This includes standards for data protocols, system to system and subsystem interfaces, vehicle data formats, telematics, impacts to motorist safety, accuracy, and data security and protection.

ACTIONS

1) Engage standards bodies including the Society for Automotive Engineers (SAE), the National Institute of Standards and Technologies (NIST), and revenue collection entities including the Payment Card Institute (PCI).
2) Incorporate standards at the onset of systems design and allow for consistent updates.
3) Continue evaluating the technology market and adjust standards as necessary based on changes in technology

RECOMMENDATION

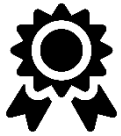
Standards references should be included in all technical requirements, specifications for bid, and certification and test criteria. Third-party providers should be required to show compliance with standards through self-certification as well as undergo compliance audits prior to deploying their systems.

6.3 NATIONAL INTEROPERABILITY

Fuel taxes were initially adopted by Oregon and subsequently by numerous other states. A federal fuel tax was not implemented until many years after, and a similar pattern may occur with RUC. Two states (Oregon and Utah) have already implemented systems with a third preparing for a 2022 – 2023 deployment. A federal system and associated national operational framework for interoperability will likely only occur once more states have implemented.

ACTIONS

1) Consider national interoperability during pilot design
2) Incorporate interoperability into technical and business requirements during system design



RECOMMENDATION

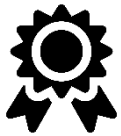
Structure technical and business requirements to be flexible and based on industry standards. Work with states that have implemented the concept to identify opportunities for interoperability.

6.4 MOBILITY-AS-A-SERVICE

The public increasingly has access to mobility options outside of personal vehicle ownership. Americans continue to have access to alternative modes like transit, and alternative mobility services such as carsharing and ridehailing provide access to vehicles or rides for a usage fee. Furthermore, mobility wallet applications integrate all services (including transit) into one platform for expedited booking and payment. In the future, the family of Mobility-as-a-Service (MaaS) applications may serve as an additional account management option for RUC system users.

ACTIONS

1) Consider MaaS and related applications during pilot design
2) Incorporate Maas and related technical and business requirements during system design



RECOMMENDATION

Monitor MaaS service offerings and coordinate with providers in the development of technical and business requirements that can accommodate these systems without impeding business operations.

7 ACTIONS DEFINITION

As states consider the implementation of an operational RUC program over a 10-year timeframe, there are several actions items, across multiple categories, that need to occur. These actions will determine the efficiency and effectiveness of the eventual RUC program. This section outlines the necessary actions that needs to occur, agnostic of implementation scenario. The categories of actions include strategy and goals, policy and equity, technology, communications, revenue impacts, and organizational administration.

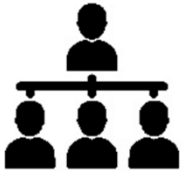
STRATEGY AND GOALS

POLICY AND EQUITY

REVENUE IMPACTS

TECHNOLOGY

COMMUNICATIONS



ORGANIZATIONAL ADMINISTRATION

7.1 STRATEGY AND GOALS

States must set the appropriate programmatic goals and supporting strategy to achieve an operational RUC program, requiring states to develop the appropriate RUC programmatic features, diagnose the context and associated public attitudes towards RUC, conduct legislative outreach, and advise state legislatures on what should and should not be included in authorization legislation. Different policy goals can often conflict in a RUC system, so a state must thoughtfully consider all implications.

STRATEGY AND GOALS

7.1.1 ACTIONS IN NO PARTICULAR ORDER

- **Diagnose State Context and Public Attitudes:** States that have a mandated RUC program must prioritize the assessment of demographics, geographies, and public attitudes towards RUC at the outset. Based on each state's traits and attitudes, specific programmatic features can be implemented to alleviate specific concerns and logistical challenges.
- **Define Policy Goals**: Based on the state context and public attitude, what problem does the state with to address with a RUC system? Revenue stabilization? Equity? Incentivizing a shift to ZEVs? The goals set will shape the ultimate program structure.
- **Conduct Legislative Outreach**: Initial and recurring engagement with legislators is necessary to solicit input for policy development and operational system design. Agencies should work with state legislatures to establish task forces, committees, and other legislatively sanctioned entities to establish the rationale for RUC implementation and provide policy guidance.
- **Development of Program Features**: With context and public attitudinal data, specific programmatic features should be developed that coincide with the needs of the state's population and assuage concerns. These include, but are not limited to, reporting method and payment options, data security standards, privacy protections, equity concerns, user compliance, and enforcement practices.
- **Define the Rate of Program Expansion**: Early on, states should determine the appropriate level of program expansion, as programmatic growth can have unintended consequences. In particular, separate vehicle classes as defined by their energy source or MPG must be planned.
- **Inclusion of Equity Considerations:** Equity issues must be explored, defined, and addressed for fairness in how RUC affects individuals and greater populations. As with any new policy framework, agencies should identify and, where possible, mitigate equity issues.

- **Assist in Legislative Authorization**: Authorizing legislation, which provides the framework for transportation agencies to execute the implementation of an operational RUC program, will be required. States should take the action of encouraging legislation which provides the lead agency with the administrative rule making authority to execute legislative mandates.

7.2 STANDARDS SETTING

POLICY AND EQUITY

The policy framework that governs an operational RUC program establishes the necessary features for proper implementation, administration, and future evolution. Furthermore, the policy framework will identify and mitigate known unintended consequences associated with RUC, including that RUC programs are equitable to all users. Policy prescriptions for equity include urban and rural fairness, electric and other highly fuel-efficient vehicles, and the development of payment systems that allow all income classes and users to participate. In addition to equity, the policy framework should also include privacy protections, enforcement policies, and certification standards.

7.2.1 ACTIONS IN NO PARTICULAR ORDER

- **Develop Privacy Protections:** A critical element in the advancement of existing and future RUC technologies is privacy protection. Privacy protection can be achieved with thorough testing and validation of proposed technologies and policy prescriptions that establish standards that govern the use/handling of sensitive personal information. As a result, states should take the action of setting data security standards that ensure the protect of personally identifiable information (PII). Leveraging industry practices for data security will further support data management and privacy protection practices.
- **Develop Certification Standards:** Private sector RUC account managers should be encouraged to develop new technology approaches for assessment; however, these new approaches must be shown to function properly and provide the appropriate data for program administration. Certification provides vendors a consistent, unbiased, and transparent approach for bringing new technology services to the RUC market.
- **Develop State Functional Requirements:** States should establish functional requirements that correlate to the political realities of a given state, meet the goals and objectives of the RUC program, and protect the user's privacy while ensuring data security.

7.3 TECHNOLOGY

Technologies have the potential to lower administrative costs, assist with compliance and enforcement, provide user choice and convenience, and provide opportunities for interoperability with other advancing transportation programs, such as connected vehicles and tolling operations. A litany of research and pilots have been conducted to test and understand the applicability of various technologies for RUC.

TECHNOLOGY

7.3.1 ACTIONS:

- **Define Mileage Reporting Options:** Mileage reporting and collection activities range from low tech (odometer reading through annual registration) to high tech (collection of in-vehicle telematics data). Agencies should define the types and distribution of mileage reporting devices and procedures that will be offered as a part of their operational RUC program.
- **Anticipate and Adapt to Evolving Technology:** Technologies for collecting, processing, and transmitting road usage data will continue to evolve. In-vehicle telematics and automation will continue to advance as more systems are factory installed as a standard feature. States should act to develop RUC systems that are structured so that they facilitate, or at a minimum be flexible to, technology innovation.
- **Accommodate In-Vehicle Telematics:** Embedded telematics systems provide an opportunity to collect road usage data automatically and are less prone to tampering and evasion. States should consider developing operational RUC systems that support inclusion of built upon in-vehicle telematics, and all other emerging technologies, and coordinate with original equipment manufacturers and industry groups to identify standards and suitable requirements.
- **Forecast Fleet Changeover:** The US vehicle fleet is becoming more fuel efficient and increasingly growing the use of alternative fuel and electric vehicles. States should structure technical and business requirements in accordance, so that they are agnostic to vehicle type.
- **Provide Flexibility for Mobility-as-a-Service (MaaS):** Americans use transit, carsharing, ride hailing and other alternative mobility services with payment of a use fee. Furthermore, mobility wallet applications integrate all these services into one platform for expedited booking and payment. In the future, the family of MaaS applications may serve as an additional account management option for RUC system users. States should monitor MaaS service offerings and coordinate with providers in the development of technical and business requirements that can accommodate these systems without impeding business operations.

7.4 COMMUNICATIONS

The need to educate the public and key stakeholders about the long-term sufficient funding dilemma is of critical importance. States must demonstrate why RUC is needed to augment or replace the motor fuels tax, and the development and execution of a communications plan is one of similar criticality.

COMMUNICATIONS

7.4.1 ACTIONS:

- **Audience Identification:** One of the many communications challenges associated with RUC is the complexity of speaking to multiple, diverse audiences. There are several audiences that must be considered, consulted, and educated prior to and during the implementation of an operational RUC program, including policymakers, local stakeholders, state-level agency stakeholders, external stakeholders, and the general public.
- **Conduct Robust Communications Research:** Prior to creating key messages to targeted audiences, robust market research is needed. This is achieved through public opinion surveys, focus groups at various locations throughout the state, social media, websites, and blogs to capture sentiments and issues. Once completed, the next step is to analyze the results to identify common themes, conduct quantitative and qualitative analysis, categorize research results, and prioritize key results based on their frequency of occurrence.
- **Create a Strong Communications and Messaging Presence:** A strong communications presence includes a single point of contact for all RUC-related communications, the formation of RUC Communications Task Force focused on research, analysis, and development of all communications activities and materials, ensure communications messages are aligned with program goals and objectives, create customized messaging materials based on research results, develop frequently asked questions (FAQs), and deploy communications materials in a timely manner to show responsiveness and attentiveness to public concerns. States should create a RUC program website that allows interested parties to easily access program material and answer key questions.
- **Engage and Enroll Motorists:** Initial operational RUC program deployment will require engagement with future program participants to ensure they are aware of how to enroll, their responsibilities, and options for assessment and reporting. These efforts will need to be maintained throughout the course of the program, particularly as the program expands to include new vehicle classifications. States are encouraged to establish the rate of their operational RUC program growth, create benchmarks for RUC

program goals and objectives, have sufficient customer service support, and closely correlate those elements with the level of motorist engagement and enrollment.

7.5 REVENUE IMPACTS

REVENUE IMPACTS

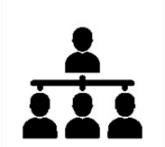
A transition away from the motor fuels tax towards an operational RUC system will inevitably create a litany of impacts to state agencies across the country. To address the impacts to revenue, states will need to take several defined actions to create as seamless of a transition to RUC as possible.

7.5.1 ACTIONS:

- **Offer Flexible and Inclusive Payment Systems:** Variety and flexibility in payment options has been a key component of many successful RUC programs and pilots. While only a few payment options may be supported upon initial implementation, the expansion of future options allows users to select the metering and assessment options they are most comfortable with. Different levels of comfort with technology, access to banking, and privacy concerns must be considered. States should consider offering public agency-based payment options in addition to those that might be offered by the private sector. The decision to offer a variety of payment system options will largely be driven by equity, privacy, and cost concerns. An additional, long-term, consideration will be the effect on regional interoperability and cross border travel.
- **Analyze and Coordinate on Administrative Costs:** As with collection costs, administrative costs are likely to change with the implementation of an operational RUC program. These costs can be minimized by leveraging existing state resources for tax and fee administration. States should act to coordinate with relevant state agencies, such as Departments of Motor Vehicles, at the early stages of the pre-implementation phase. Through interagency coordination and economies of scale, administrative cost will likely decline substantially. In the near term, however, states must decide their tolerance for administrative costs.
- **Plan for RUC Revenue Collection, Reconciliation, and Audit:** A successful operational RUC program will require accurate and timely collection of RUC revenues. This includes collecting fees from users and account managers, reconciling accounts in the events of over or under payment of RUC, and auditing RUC accounts to ensure that the appropriate amount of RUC is being assessed and collected. States should act to develop audit procedures and guides, determine appropriate accounting procedures, evaluate financial reporting and accounting systems, monitor financial accounts, and work with account managers to ensure that assessed and collected RUC funds are accurately reported, captured, collected, deposited, and reported.

7.6 ORGANIZATIONAL ADMINISTRATION

Organizational structures are the backbone of any state agency, providing staff and resources to deliver on departmental priorities and key objectives. The design of the organizational structure to support an operational RUC program will be decided based on several independent variables unique to each state.



7.6.1 ACTIONS:

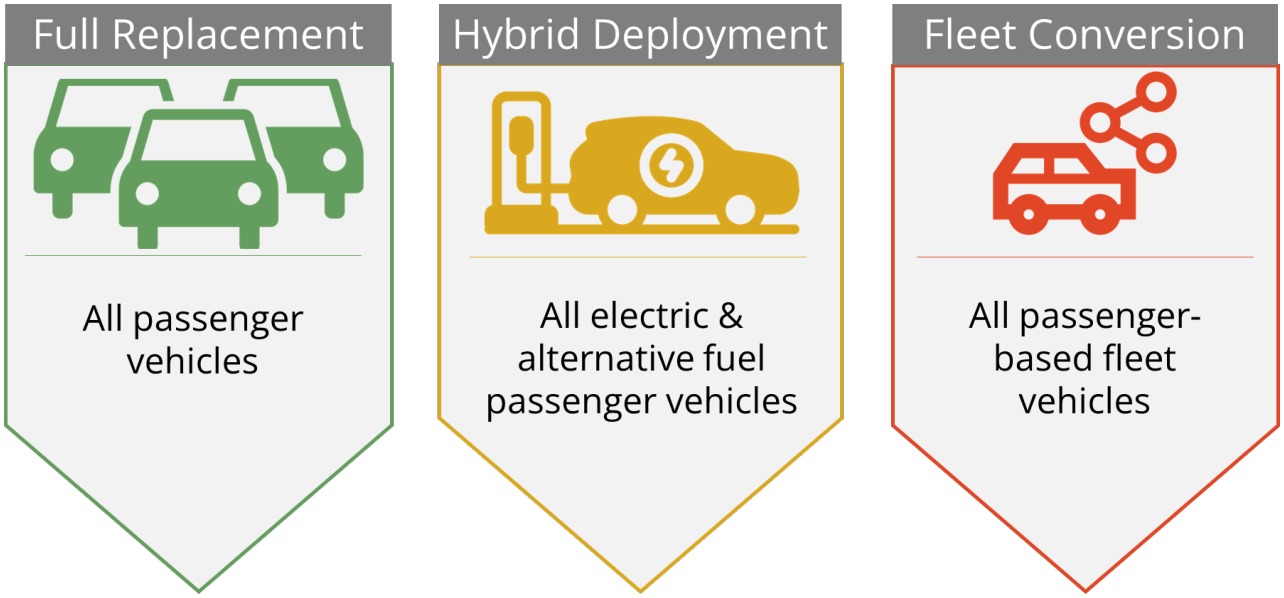
- **Define Key Positions and Functions:** An operational RUC program will require institutional functions, including contract management, revenue analysis and forecasting, program implementation support, account management (state and commercial), and public information dissemination. States should act to identify which key positions can be filled with existing full-time employees, where new full-time employees will be needed, and which positions will be filled through utilizing private sector support.
- **Create Office of RUC Program Administration:** To assist in effectively managing and administering a RUC program, it is critical that states establish a lead office responsible for the coordination of all challenges and issues that arise. For optimum implementation of the RUC program, the lead office will be the primary point of accountability for the RUC program, mitigating program issues, managing RUC operations, and supporting inquiries from other stakeholder groups. This would include identifying staffing needs, organizational frameworks, administrative system needs, associated program administrative costs, and documenting administrative efforts (which could be captured as part of initial pilot activities).
- **Establish Enforcement Protocols:** Enforcement aspects of RUC involve working with collection agencies, individual RUC payers, State Highway Patrol, or local law enforcement to establish necessary registration holds for unpaid RUC funds. Agencies should take action to determine the level of appropriate enforcement policies and embed them within the policy framework.
- **Design RUC Systems:** In anticipation of the implementation of an operational RUC program, states must create a design that will support all the technical facets for the IT systems needed to operate, manage, and administer an operational RUC program. This includes creating the technical and operational requirements for systems related to financial reporting, RUC databases, data collection, transaction processing, account management, customer service, and integration with other state systems used to report, evaluate, and enforce the RUC program. The level of effort includes creating operational concepts, developing the systems architecture, authoring technical and business requirements, identifying relevant standards, creating test plans and procedures, creating design documents and "as-builts", and providing systems design guidance to contracted technology and service providers.

8 IMPLEMENTATION SCENARIOS

Given the highly dynamic and ever-changing nature of state and national governments, there are many implementation scenarios worth considering. This section includes three distinct scenarios for implementation that are meant to guide public sector entities as they anticipate RUC implementation over a 10-year time frame.

The **Full Replacement** scenario replaces the motor fuels tax with RUC all at once and for all passenger vehicles. The **Hybrid Deployment** scenario deploys RUC for all electric, hydrogen, biofuel, and natural gas-powered vehicles. Under this scenario it is assumed that the motor fuels tax would remain in place for all gasoline or diesel vehicles. Finally, the **Fleet Conversion** scenario applies RUC initially to fleet vehicles, such as transportation network companies (TNCs), taxis, rental vehicles, and light duty delivery vehicles. However, within 10 years, RUC is migrated to all vehicles.

The exploration of these scenarios will be conducted through the perspective of users and their unique experiences. Each user story, which includes drivers, departments of transportation, and other state agencies, articulates the experience of specific parties and what they will encounter. This section concludes with a comparative assessment between each scenario.



8.1 SCENARIO 1: FULL REPLACEMENT

Under the "Full Replacement" scenario, the lead agency is directed to use RUC to fully replace the motor fuels tax. This scenario would see the immediate migration of all passenger vehicles, regardless of fuel type, vehicle fuel efficiency, or location, into an operational RUC program. The key difference between the Full Replacement scenario and other scenarios is the pace, size, and magnitude of change that occurs over a short timeframe. This holistic and immediate transition will create change for the driver, reshape the makeup and operations of state departments of transportation, and create new areas for coordination among state agencies. Realistically though, this could involve several months of pre-enrolling vehicles by class or category, establishing accounts, and perhaps even doing motorist familiarity training or small-scale pilot demonstrations to familiarize motorists before the immediate swap over occurs. States who explore this approach should evaluate the complexities against revenue implications and administrative hurdles.

8.1.1 DRIVER EXPERIENCE

During the Full Replacement scenario, the experience of the driver will be filled with changes as the transition to RUC beings. Below is a summation of the driver's user experience by transition phase.

- **Pre-Implementation:** During the pre-implementation phase, the driver will begin to receive RUC program information from a variety of sources as the state begins to build awareness and public acceptance of the upcoming change to RUC.
- **Development Phase:** As the transition progresses into the development phase, the driver will receive detailed information from the state making them aware of how to enroll, their responsibilities, and the mileage reporting options.
- **Operational Phase:** Beginning in the later stages of the development phase or in the early stages of the operational phase, drivers will begin enrollment in the operational RUC program. During this stage drivers will experience registering with a state or commercial account manager, selecting a mileage reporting option, and receiving and installing a mileage reporting device (if applicable). Once enrolled in the program, drivers will resume driving as normal, but will now be asked to monitor their account and make on time payments. For those that fail to pay the RUC fees, several enforcement actions such as registration holds could become a possibility.

8.1.2 LEAD AGENCY EXPERIENCE

During the Full Replacement scenario, the experience of state Departments of Transportation (or lead agency such as the Department of Revenue and the Department of Motor Vehicles) will be one of coordination, transformation, and evolution. DOTs will be under pressure to quickly develop the RUC systems and functions across state government to support full implementation. During the Full Replacement scenario, the rate of program expansion is likely to be much faster than other scenarios due to the urgency of the authorizing legislation. Below is a summation of the DOT's experience by transition phase.

- **Pre-Implementation:** During the pre-implementation phase, DOTs will begin conducting public education and awareness campaigns to build public acceptance for the program. These campaigns will likely be statewide and highly visible. It is at this point where DOTs will likely determine the rate of program expansion for the operational RUC program and begin coordinating with other relevant state agencies on roles and responsibilities. This will create a clear understanding of when, and the rate of which, vehicles will be enrolled in the program.
- **Development Phase:** As DOTs move into the development phase, they will begin to develop and implement the organizational structures that will support the operational RUC program, engage and enroll motorists, develop privacy protection, select payment systems, design state and commercial account management practices, and determine which mileage reporting options will be offered.
- **Operational Phase:** DOTs will begin experiencing high levels of enrollment and significant operational RUC program growth. Hundreds of thousands, if not millions, of drivers will be transitioning in the operational RUC program during this phase. Good customer service will be critical. Also, during this phase DOTs will continue to improve systems and processes, such as data accuracy and auditability, certification standards, and enforcement practices.
- **Evolution Phase:** During the later portion of the 10-year implementation window, DOTs will experience the evolution of the operational RUC program. This means the introduction and inclusion of new technology, such as in-vehicle telematics and mobility-as-a-service, continued program monitoring and fully automated processes that are lowering administration burden and cost.

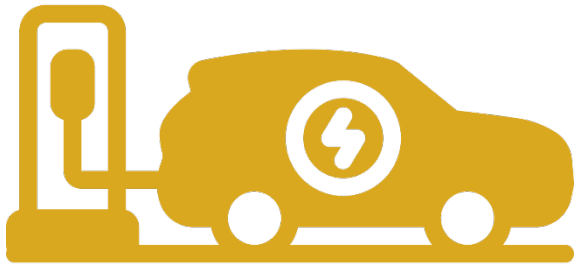
8.1.3 OTHER STATE AGENCIES EXPERIENCE

There are several state agencies that will play a role in an operational RUC system. Below is a summation of the various state agencies' experience by transition phase.

- **Pre-Implementation:** Due to the fast pace of implementation associated with the Full Replacement scenario, state agencies will begin the process of coordination in the early stages of the pre-implementation phase. As part of the coordination effort state agencies will work together with the DOTs to outline clear roles and responsibility, process improvements, pertaining to the implementation and management of the operational RUC program.
- **Development Phase:** As the operational RUC program moves into the development phase, state agencies will begin to develop and implement the necessary organizational structures, and process improvements, to accommodate their roles and responsibilities for the operational RUC program. Due to the fast pace of implementation, state agencies will likely experience a period of rapid change as they move to identify and acquire the key positions and functions needed for their organizations to support the operational RUC program.
- **Operational Phase:** During the operational phase, state agencies, working in coordination with DOTs, will participate in cross agency interaction to facilitate the essential functions of the operational RUC program. Information sharing between agencies will be commonplace and linkage may be deeper than they were during the period of the motor fuels tax.
- **Evolution Phase:** Through the pre-implementation, development, and operational phases state agencies and DOTS will have developed strong working relationships predicated on clear roles and responsibilities. These strong working relationships, in addition to the newly acquired institutional knowledge gains, will position state government during the evolution phase. They will be well positioned to adapt to new technologies, changes to bureaucracy across political administrations, and other emerging trends.

8.2 SCENARIO 2: HYBRID DEPLOYMENT

Under the "Hybrid Deployment" scenario, the lead agency is directed to use RUC to replace all non-gasoline and diesel fuels vehicles. This scenario would see the migration of electric, compressed natural gas, biofuel, and hydrogen fuel cell vehicles into the operational RUC program. However, the motor fuels tax remains in place for all vehicles that use gasoline or diesel into perpetuity. This scenario represents a more tempered approach to RUC transition and will present less implementation strain and challenges for states than the Full Replacement scenario, but may not achieve certain policy goals. This partial and gradual approach transition will create change for a subset of drivers, reshape the makeup and operations of state departments of transportation, and create new areas for coordination among state agencies.



8.2.1 DRIVER EXPERIENCE

During the Hybrid Deployment scenario, the driver's experience will involve the following by transition phase.

- **Pre-Implementation:** At the beginning of the transition, during the pre-implementation phase, the drivers of alternative fuel vehicles will begin to receive RUC program information from a variety of sources as the state begins to build awareness and public acceptance of the upcoming change RUC.
- **Development Phase:** As the transition progresses into the development phase, the driver will receive detailed information from the state making them aware of how to enroll, their responsibilities, and the mileage reporting options.
- **Operational Phase:** Beginning in the later stages of the development phase or in the early stages of the operational phase, drivers will begin enrollment in the operational RUC program. During this stage, drivers will register with a state or commercial account manager, select a mileage reporting option, and receive and install a mileage reporting device or software package (if applicable). Once enrolled in the program, drivers will resume driving as normal, but will now be asked to monitor their account and make on time payments. For those that fail to pay the RUC fees several enforcement actions, such as registration holds, could become a possibility.

8.2.2 DOT EXPERIENCE

During the Hybrid Deployment scenario, the experience of state departments of transportation will be one of coordination, transformation, and evolution. DOTs will be under significantly less pressure to quickly develop the RUC systems and functions, across state government, to support full implementation due to the smaller size of the eligible vehicles. The rate of program expansion is likely to be slower and more methodical than other scenarios due to the urgency of the authorizing legislation.

- **Pre-Implementation:** During the pre-implementation phase, DOTs will begin conducting public education and awareness campaigns to build public acceptance for the program. It is at this point where DOTs will likely determine the rate of program expansion for the operational RUC program and coordinate with other relevant state agencies on roles and responsibilities. This will create a clear understanding of when, and the rate of which, vehicles will be enrolled in the program.
- **Development Phase:** As DOTs move into the development phase, they will begin to develop and implement the organizational structures that will support the operational RUC program, engage and enroll motorists, develop privacy protection, select payment systems, design state and commercial account management practices, and determine which mileage reporting options will be offered. The pace of implementation and deployment of this program features will be more methodical in the Hybrid Deployment scenario due to the urgency associated with the overall rate of program expansion.
- **Operational Phase:** DOTs will begin experiencing high levels of enrollment and significant operational RUC program growth. Since the Hybrid Deployment scenario is dealing with a smaller of subset of vehicles of drivers, the number of vehicles transitioning in the operational RUC program during this phase will be much lower, and more manageable, than in other scenarios. Also, during this phase DOTs will continue to improve systems and processes, such as data accuracy and auditability, certification standards, and enforcement practices.
- **Evolution Phase:** During the later portion of the 10-year implementation window, DOTs will experience the evolution of the operational RUC program. This means the introduction and inclusion of new technology such as in-vehicle telematics and MaaS, continued program monitoring and fully automated processes that are lowering administration burden and cost. By virtue of smaller, more manageable, subset of vehicles in the Hybrid Deployment scenario, the possible future expansion of other types of vehicles will benefit from the development and maturity of the operational RUC program.

8.2.3 OTHER STATE AGENCIES EXPERIENCE

Activities for other state agencies, as described in 8.1.3 above, include the following by transition phase.

- **Pre-Implementation:** Although the Hybrid Deployment scenario requires a smaller subset of vehicles and operates on an extended timeline for implementation, state agencies will still begin the process of coordination in the early stages of the pre-implementation phase. As part of the coordination effort state agencies will work together with the DOTs to outline clear roles and responsibility, process improvements, pertaining to the implementation and management of the operational RUC program.
- **Development Phase:** As the operational RUC program moves into the development phase, state agencies, like the DOTs, will begin to develop and implement the necessary organizational structures, and process improvements, to accommodate their roles and responsibilities for the operational RUC program. This will happen on a smaller scale than the other scenarios; however, the same functions will need to be developed and coordinated across state government. Even though the pace of implementation is slower and more methodical, state agencies will experience internal change as they move to identify and acquire the key positions and functions needed for their organizations to support the operational RUC program.
- **Operational Phase:** During the operational phase, state agencies, working in coordination with DOTs, will participate in cross agency interaction to facilitate the essential functions of the operational RUC program. Information sharing between agencies will be commonplace and linkage may be deeper than they were during the period of the motor fuels tax. Given the slower, more methodical, nature of the pace of implementation state agencies will a gradual shift in operations as motorists begin enrollment into the operational RUC program.
- **Evolution Phase:** Through the pre-implementation, development, and operational phases state agencies and DOTS will have developed strong working relationships predicated on clear roles and responsibilities. These strong working relationships, in addition to the newly acquired institutional knowledge gains, will well position state government during the evolution phase. This will be particularly important if policy changes arise that require full implementation of the operational RUC pilot.

8.3 SCENARIO 3: FLEET CONVERSION

Under the "Fleet Conversion" scenario, the lead agency is directed to use RUC to replace the motor fuels tax for fleet vehicles, including transportation network companies (TNCs), taxis, carshare services, rental vehicles, and light duty delivery vehicles. This scenario represents a tempered approach to RUC transition and will present less strain for states than the Full Replacement scenario. This gradual approach to transition will utilize a subset of drivers to slowly develop an operational RUC program, reshape the makeup and operations of state departments of transportation, and create new areas for coordination among state agencies. Once the fleet conversion has taken place, all remaining light duty passenger vehicles will be enrolled in the operational RUC program.

8.3.1 DRIVER (FLEET MANAGER) EXPERIENCE

During the Fleet Conversion scenario, the experience of the fleet manager is summarized by transition phase.

- **Pre-Implementation:** At the beginning of the transition, during the pre-implementation phase, fleet managers will begin to receive RUC program information from a variety of sources as the state begins to build awareness and public acceptance of the upcoming change to RUC.
- **Development Phase:** As the transition progresses into the development phase, the fleet managers will receive detailed information from the state making them aware of how to enroll, their responsibilities, and the mileage reporting options.
- **Operational Phase:** Beginning in the later stages of the development phase or in the early stages of the operational phase, fleet managers will begin enrollment in the operational RUC program. During this stage, fleet managers will register with a state or commercial account manager, select a mileage reporting option, and receive and install a mileage reporting device (if applicable). Once enrolled in the program, fleet managers will now monitor their account and make on time payments. For those that fail to pay the RUC fees several enforcement actions, such as registration holds, could become a possibility.
- **Evolution Phase:** At the later portion of the operational phase continuing into the evolution phase, all non-fleet drivers will experience registering with a state or commercial account manager, selecting a mileage reporting option, and receiving and installing a mileage reporting device (if applicable).

8.3.2 DOT EXPERIENCE

During the Fleet Conversion scenario, DOTs will be under significantly less pressure to quickly develop the RUC systems and functions to support full implementation due to the initially smaller size of the eligible vehicles for the operational RUC program. However, over time, the rate of program expansion will grow in intensity as all non-fleet vehicles begin to enter the operational RUC program.

- **Pre-Implementation:** During the pre-implementation phase, DOTs will begin conducting public education and awareness campaigns to build public acceptance for the program. These campaigns will likely be targeted to all drivers statewide and be highly visible. It is at this point where DOTs will likely determine the rate of program expansion for the operational RUC program and coordinating with other relevant state agencies on roles and responsibilities. This will create a clear understanding of when, and the rate of which, vehicles will be enrolled in the program.
- **Development Phase:** As DOTs move into the development phase, they will begin to develop and implement the organizational structures that will support the operational RUC program, engage and enroll motorists, develop privacy protection, select payment systems, design state and commercial account management practices, and determine which mileage reporting options will be offered.
- **Operational Phase:** DOTs will begin experiencing high levels of enrollment and significant operational RUC program growth. Since the Fleet Conversion scenario is dealing with a smaller subset, the number of vehicles transitioning in the operational RUC program during this phase will be much lower, and more manageable initially. This will provide DOTs time to continue to improve systems and processes, such as data accuracy and auditability, certification standards, and enforcement practices.
- **Evolution Phase:** During the later portion of the operational phase and early stages of the evolution phase, DOTs will experience the inclusion of hundreds of thousands, if not millions of new drivers into the operational RUC program. This could potentially hinder the evolution of the operational RUC program. However, DOTs will have the opportunity to introduction new technologies such as in-vehicle telematics and MaaS as their operational RUC program continues to grow.

8.3.3 OTHER STATE AGENCIES EXPERIENCE

Activities for other state agencies, as described in 8.1.3 above, include the following by transition phase.

- **Pre-Implementation:** During the Fleet Conversion scenario, states agencies will be asked to move quickly to design RUC systems to accommodate the influx of fleet vehicles. In the early stages of the pre-implementation phase state agencies will begin the process of coordination with DOTs to outline clear roles and responsibility, process improvements, pertaining to the implementation and management of the operational RUC program.
- **Development Phase:** As the operational RUC program moves into the development phase, state agencies, like the DOTs, will begin to develop and implement the necessary organizational structures, and process improvements, to accommodate their roles and responsibilities for the operational RUC program. While there will be an initial influx of fleet vehicles entering the program, agencies will have additional time to make the necessary changes prior to enrollment of all vehicles. During this development phase, state agencies will experience a period of moderate change as they move to identify and acquire the key positions and functions needed for their organizations to support the operational RUC program.
- **Operational Phase:** During the operational phase state agencies, working in coordination with DOTs, will participate in cross agency interaction to facilitate the essential functions of the operational RUC program. At this point, all fleet vehicles have been enrolled in the operational RUC program. State agencies are now information sharing and the linkages between agencies may be deeper than they were during the period of the motor fuels tax. These relationships and established processes will be beneficial to state agencies as they will experience a period of rapid change in the operational phase.

  Evolution Phase: State agencies will likely continue to see enrollment into the evolution phase; however, at this point state agencies have matured. Through the pre-implementation, development, and operational phases state agencies and DOTS will have developed strong working relationships predicated on clear roles and responsibilities. These strong working relationships, in addition to the newly acquired institutional knowledge gains, will well position state government during the evolution phase.

9 IMPLEMENTATION PLAN

Each of the three implementation scenarios provide opportunities and challenges towards achieving the RUC transition. Although an exhaustive comparison is not possible, given the contextual differences that may occur for each agency and statutory environment, there are some general components that do lend themselves well to high level comparisons.

1	EFFECTIVENESS OF TRANSITION	How easily does the scenario transition passenger vehicles from the motor fuel tax to a road usage charge?
2	DEGREE OF EQUITY PROMOTION	How well does the scenario lend itself in promoting equity and fairness across vehicle types, geographic locations, and other socioeconomic conditions for motorists? How well does the scenario offer pathways to full participation?
3	DEGREE OF MOTOR FUEL TAX REVENUE REPLACEMENT	How effectively does the scenario create revenues that equal or improve those created by the motor fuel tax? How well does the scenario pose opportunities for enhancing revenue generation?
4	SUPPORTS MULTIPLE TECHNOLOGIES	How accommodating is the scenario to existing and available technologies? How much flexibility does the scenario allow for new and emerging technologies and markets?
5	LEVERAGES EXISTING STATE ORGANIZATION	To what extent does the scenario necessitate additional levels of administration and resources?
6	SUPPORTS A COST-EFFECTIVE DEPLOYMENT	How conducive is the scenario to promoting low deployment costs?
7	ENCOURAGES SIMPLE PUBLIC COMMUNICATIONS	How well does the scenario support simple and effective targeted communications and/or political engagement?
8	RISK AVERSE	How politically, technically, or financially risk averse is the scenario?

As with any scenario, there are several trade-offs. Each scenario is evaluated by phase and the challenges of each of the associated tasks. **Table 1** highlights how each of the scenarios compare against one another.

All Scenarios								
	Supports Easy Motorist Migration	**Degree of Equity Promotion**	**Effectiveness in Replacing MFT Revenues**	**Supports Multiple Technologies**	**Leverages Existing State Organization**	**Supports A Cost Effective Deployment**	**Encourages Simple Public Comms**	**Degree of Risk Aversion**
Scenario 1 Full Replacement								
Scenario 2 Hybrid Transition								
Scenario 3 Fleet Conversion								

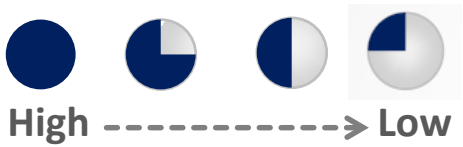


Table 1. Analysis of All Scenarios

9.1 SCENARIO 1: FULL REPLACEMENT

Under the "Full Replacement" scenario, the lead agency is directed to use RUC to fully replace the motor fuels tax. This scenario would see the immediate migration of all passenger vehicles, regardless of fuel type, vehicle fuel efficiency, or location, into an operational RUC program. Some of the key considerations and challenges, and recommendations relative to each evaluation category are identified below:

- **Supports Easy Motorist Migration:** This scenario offers the highest degree of complexity with enrolling vehicles. Vehicles spanning all makes, models, powertrains, purpose, and domiciled locations would quickly migrate from a per-gallon funding model to a per-mile approach.
    - **Challenges:** The immediate and sudden rate of program growth may lead to sporadic revenues, increased risk of implementation problems, confused motorists, and high enforcement violations.
    - **Recommendations:** Create a phased-implementation plan with key milestones and benchmarks, either based on vehicle category, registered location, or perhaps purpose that harmonizes revenue streams and supports a methodical transition. Develop a comprehensive communications engagement campaign through existing agencies such as Department of Motor Vehicles, to notify motorists of the transition and establish clear milestones for transition to mitigate any confusion from enrolled motorists.
- **Degree of Equity Promotion:** This scenario supports the highest degree of equity promotion. As all vehicles and motorists, regardless of their location, vehicle type, or other socioeconomic factors will be enrolled, any one particular group will not be singled out or forced to pay an unequitable share.
    - **Challenges:** With such a large-scale implementation, some groups will feel they are being treated unfairly. Electric vehicle owners may feel they are being unfairly penalized as their vehicles help reduce our dependence on fossil fuels or emissions. Rideshare services may feel they are being treated unfairly as they are supporting congestion mitigation with their programs. Rural motorists may feel that moving to a RUC may unfairly penalize them as they drive longer distances.
    - **Recommendations:** Conduct consistent messaging that explains how the entire fuel tax based funding model is no longer sustainable and that all motorists need to support their fair share to ensure a reliable transportation infrastructure. Recruit key champions, spanning bipartisan government officials, celebrities, and professional advocacy

groups to help promote messages to the public. Launch web-based calculators showing what a motorist pays under the current model versus what they would pay in a RUC.

- **Effectiveness in Replacing Motor Fuel Tax (MFT) Revenues:** This solution provides the highest revenues for replacing the motor fuel tax. Under this scenario, all vehicles previously paying a motor fuel tax would transition to a RUC. If policy and rates are set properly, the revenues that would be generated would at least mimic those seen under the current motor fuel tax, if not improve with the integration of electric vehicles**.**
    - **Challenges:** Initially, as motorists transition to a RUC, their driving habits may change as they become more sensitive to paying by the mile and may temporarily decrease revenues. Given the behavioral considerations a RUC places on motorists, investors and bond evaluators may place higher risk ratings to RUC-funded bonds. This could have an adverse affect in long-term investments.
    - **Recommendations:** Establish early and often communications to remove preconceived risks or anticipated behavioral changes. Create a RUC calculator, launch pilot demonstrations, and show how the impacts under a RUC will be considerably less than imagined. Implement prepaid payment options like an "e-wallet" or consolidate RUC payment with other funding services to encourage familiarity. Create a robust financial revenue model that forecasts RUC revenues taking into consideration behavior concerns but showing long-term harmonization of VMT to help inform bond evaluators.
- **Supports Multiple Technologies:** This scenario offers the highest availability to support multiple technologies. Given that all vehicles would be enrolled, regardless of their make, model, year, or powertrain, the need to accommodate multiple technologies is paramount. Choice of technologies and account management options will be key to promoting acceptance by such a wide array of motorists.
    - **Challenges:** The need for multiple choices will present challenges related to certification of technologies and private sector companies. Also, the lack of readily available standards places a considerable challenge to the DOT in certifying technologies that can accurately, securely, and reliably collect RUC-related information from vehicles. Finally, the lack of an OBD-II port on vehicles older than 1996 presents an additional problem which requires a no-tech solution.
    - **Recommendations:** Explore options that offer high-tech, low-tech, and no-tech possibilities to motorists. Create certification standards that balance complexities with the need to promote trust and reliability and engage entities like OmniAir to offer self-certification options for account managers. States should also explore options with account

managers who already have a market presence and can integrate RUC with their existing service capabilities, like cellular data plans, utilities, tolling, in-vehicle telematics, or other possibilities that encourage familiarity.

- **Leverages Existing State Organization:** This scenario is not well-suited to accommodate existing organizational structures without a considerable augmentation of new staff. While much of the motorist correspondence and outreach can be supported using private-sector account managers, additional staff will be necessary given the sheer volume alone.
    - **Challenges:** The number of touch points necessary for coordination, communications, revenue collection, and enforcement exponentially increases from those previously needed under the motor fuel tax. Additional staff will be needed to communicate messages, oversee account managers, collect unpaid RUC, and conduct auditing and compliance evaluation.
    - **Recommendations:** Create a robust organizational framework that identifies the necessary new staff to administer a RUC program, including ways to retain existing staff. Ensure the state budget includes sufficient staffing resources. Provide clear roles and responsibilities spanning multiple departments and offices within those departments for: contracting, payment enforcement, auditing and compliance, communications, program evaluation, technology certification, program administration, legislative coordination, interoperability, and financial reporting. Consider temporarily outsourcing administrative responsibilities while new staff can be hired and existing staff can be retrained to support new RUC operations.
- **Supports a Cost-Effective Deployment:** A full statewide transition to RUC poses the highest deployment costs of all identified scenarios. The costs to fund all features (communications, technical systems, policy, compliance, organizational structures, staffing, etc.) from initial rollout to full operations will be considerable and states who explore this approach must be willing to invest considerable dollars into the transition from the motor fuel tax to a RUC.
    - **Challenges:** There will be considerable cost to effectively communicate to all motorists and vehicle types, create and certify technical systems, identify and establish contracts with or certify private-sector companies, hire and train new staff, provide customer service, and establish new systems and processes.
    - **Recommendations:** Create phased milestones and initiatives that spread the deployment costs out over several years. Engage other administrative offices, including tolling operators, transit operators, or other entities to share services. Public-private partnerships between states and private entities should also be explored to identify potential cost sharing initiatives.

- **Encourages Simple Public Communications:** In the early stages of RUC program development, specifically the pre-implementation and development phases, communications efforts maintain a high level of significance. Extensive communications activities such as focus group, public polling, and statewide education campaigns with the general public and key stakeholders will be required to build public acceptance.
    - **Challenges:** The magnitude of participants for this type of RUC deployment will require a considerable amount of communications messaging, research, and engagement. The considerable number of motorists, and the need to communicate to their unique needs will pose a considerable amount of complexity and challenges.
    - **Recommendations:** Conduct initial communications research, to include surveys, focus groups, and opinion polls. Create a series of targeted communications messages, presented by local celebrities, legislators, and professional organizations, to address specific findings from the research. Engage their Public Information Office to address negative ads and deploy a campaign that promotes the collective benefits each motorist gains from a reliable and robust infrastructure, coupled with the need for new funding sources, and explains the benefits of a new funding model.
- **Degree of Risk Aversion:** A litany risks are associated with the Full Replacement scenario. The complexity of a full-scale RUC implementation poses several risks that must be addressed over the course of the program.
    - **Challenges:** The primary technical challenge associated with the Full Replacement scenario is the time needed to develop and test the RUC systems that will serve as the backbone of the operational RUC system. There may also be significant political challenges if the operational RUC program encounters mishaps during the rollout and initial enrollment of vehicles due to the hasty pace of implementation. Compliance and enforcement policies will entail new procedures for a variety of state agencies and will likely take time to be embraced and executed effectively.
    - **Recommendations:** Proactively identify and engage risks. Categorize risks across multiple areas such as: public acceptance, technical, process, cultural, organizational, political, etc. Identify champions for each category who have experience in dealing with challenges in their respective areas and engage them to develop strategies to help mitigate the risks. Develop a risk management plan to clearly identify, prioritize, engage, monitor, and ultimate mitigate those risks that pose the largest challenges to the program.

9.2 SCENARIO 2: HYBRID DEPLOYMENT

Under the "Hybrid Deployment" scenario, the lead agency is directed to use RUC replace all non-gasoline and diesel fuels vehicles. This scenario would see the migration of electric, compress natural gas, biofuel, and hydrogen cell vehicles into the operational RUC program. However, the motor fuels tax remains in place for all vehicles that use gasoline or diesel in perpetuity. This scenario represents a more tempered approach to RUC transition and will present less implementation strain and challenges for states than the Full Replacement scenario. Some of the key considerations and challenges, and recommendations relative to each evaluation category are identified below:

- **Supports Easy Motorist Migration:** This scenario offers medium complexity with vehicle enrollment compared to a large-scale statewide enrollment encompassing all vehicle types.
    - **Challenges:** While fewer vehicles will be enrolled under this scenario, there are still significant challenges with migrating vehicles with these different powertrains. While initially, these classes will represent a smaller population of the overall vehicle pool, as states and vehicle manufacturers migrate away from fossil-fuel powered vehicles, the number of enrollees will become more complex. Furthermore, developing and communicating rate structures that support sustainable revenue while not dissuading from alternative fuel vehicle purchases, is an important stepping stone to overall acceptance and migration.
    - **Recommendations:** Conduct an initial economic impact analysis to help determine revenue implications from any transition. Start with the vehicles that can immediately transition to a RUC that have the fewest political sensitivities. Explore pilot programs using state fleet vehicles that use alternative fuels. Impose registration fees that equate to the lost revenues from motor fuel taxes, based on average fuel economy, and offer ways to alternative fuel owners to initially enroll in RUC without paying more than what they already pay in alternative fuel royalties as a means to promote familiarity.
- **Degree of Equity Promotion:** This scenario potentially brings more equity into taxpayer contributions to road maintenance, depending on how the rate is set, as the vehicles that would fall under RUC are currently not contributing equitably and tend to be owned by those at the higher end of socioeconomic categories.

- **Challenges:** The biggest equity challenge facing this hybrid scenario relates to concerns of these vehicle owners feeling that they are unfairly being penalized for helping to reduce carbon emissions and global reliance on fossil fuels.
- **Recommendations:** As with other scenarios, consistent messaging and focusing on the need for everyone to pay their fair share for roadway use is recommended. Engaging specific vehicle owner groups, and pilot studies may help allay concerns and gain political acceptance. Integrating RUC with other more effective tax incentives offered for alternative fuels, such as federal and state purchase incentives, may also help promote acceptance across these vehicle classes.

- **Effectiveness in Replacing Motor Fuel Tax (MFT) Revenues:** Initially, this scenario provides little in the way of augmenting MFT revenues to the point of replacement. However, as more electric vehicles enter the market due to price point reductions and increases in charging availability, the possibility of RUC replacing the MFT under this scenario becomes more and more possible.
  - **Challenges:** Initially, cost effectiveness will be the biggest challenge with RUC under this scenario. Initially, the costs necessary to deploy this program will far outweigh the revenues received for such a small vehicle pool. The challenge will be to maintain the program viability in a political environment that may want immediate positive cashflow.
  - **Recommendations:** This challenge can be overcome by treating the program, at least initially as a way to familiarize motorists with the concept. Established RUC rates could be set to not exceed any registration royalties, nor should RUC impede any existing tax benefits. During this "trial period", states should explore ways to use RUC revenues to offer more convenient services, EV charging infrastructure, and alternative fuel depots for motorists to show how RUC can be used to improve the overall transportation environment.
- **Supports Multiple Technologies:** This scenario offers some availability to support multiple technologies but not as many as currently possible through a full-scale implementation.
  - **Challenges:** While many high-tech, low-tech, and no-tech options could be made available, the unavailability of a vehicle's on-board diagnostic (OBD-II) port poses limitations on plug-in technologies. Furthermore, companies may not be willing to provide technologies for a smaller pool of vehicles.
  - **Recommendations:** Explore viable options outside of the OBD-II port devices that could serve RUC. Engage companies and data brokers that already provide services for alternative fuel vehicles. Explore ways to engage alternative fuel depots and electric charging providers to serve as RUC account managers.

- **Leverages Existing State Organization:** This scenario may require additional staff, but at least initially, not to the same degree as a statewide immediate implementation. Initially, existing staff may be able to be retrained to support a RUC program administration, but as more and more vehicles move to alternative fuel methods, additional staff may be necessary.
    - **Challenges:** While the volume of initial motorists is considerably less than the Full Replacement scenario, there is still a challenge of having available staff to accommodate a new program, especially while in parallel to a state's existing motor fuel tax.
    - **Recommendations:** An organizational framework is recommended that identifies the staff needs, training requirements, and complexities needed to administer two parallel revenue streams. While challenging for the first few years, the longer transition time allows for staff to train on the new processes without the immediate need to take on new roles. Over subsequent years, as more and more motorists migrate towards alternative-fuel vehicles, the complexities and challenges decrease to the point that parallel administrative streams may not be necessary. This may allow for using existing staff without the need for a considerable ramp up in staffing.
- **Supports a Cost-Effective Deployment:** This scenario poses some deployment costs to states, but not as many as anticipated with the Full Replacement scenario.
    - **Challenges:** While deployment costs for some activities such as communications, technical systems, policy, compliance, organizational structures, staffing, etc. will still be required, the costs can be phased across multiple years to minimize the initial financial impact. Also, as more and more states deploy RUC programs, states can share collateral and intellectual capital through pooled fund studies that may help offset the overall deployment costs. However, if initial numbers are too small, states may have difficulty attracting commercial account managers because no significant expansion in market access is perceived.
    - **Recommendations:** Develop a phased deployment plan and identify phased costs. Engage in pooled fund studies and collaborate with other states and organizations who are also deploying RUC to identify shared collaboration opportunities to help offset costs.
- **Encourages Simple Public Communications:** Communications around this scenario will be robust but can initially be limited to only those motorists who drive alternative fuel vehicles. As the program evolves and more and more vehicles are enrolled, communications messages should expand.

- **Challenges:** The biggest communications challenge faced by this scenario is the need to engage motorists who may already feel they have acted benevolently. Some motorists purchase alternative fuel and electric vehicles to show environmental friendliness. As such, they may not be willing to engage in conversations with improving transportation as it should be addressed by other motorists, like heavy trucks.
- **Recommendations:** Show how a reliable transportation infrastructure is a shared responsibility. Communicate vehicle costs based on each vehicle type and communicate the tax incentives for alternative fuel ownership against the costs paid by other vehicle types and powertrains.

- **Degree of Risk Aversion:** While there are still many of the same risks associated with the Hybrid Deployment scenario as with the Full Replacement scenario, the fewer number of initially enrolled vehicles poses less overall risk to a state.
  - **Challenges:** Challenges exist, including overall public acceptance, technology, process integration, organizational complexities, and political acceptance. These challenges could be greater as RUC may be seen as a penalty to environmentally friendly vehicles. However, the volume of vehicles alone, coupled with the fewer number of enrollees, and fewer options for mileage reporting and account management, poses less overall risk than that posed by a full replacement scenario.
  - **Recommendations:** Accelerate the use of telematics data to help assuage technical risk. To address specific political risks relative to targeting environmentally friendly vehicles, communicating existing tax incentives and showing the financial impact for RUC, relative to other common costs, can help assuage concerns. To help address specific useability risks, pilot demonstrations have been shown to gain support through familiarity and improving understanding while negating common misconceptions.

9.3 SCENARIO 3: FLEET CONVERSION

Under the "Fleet Conversion" scenario, the lead agency is directed to use RUC replace the motor fuels tax for fleet vehicles initially. This scenario would see the migration of transportation network companies (TNCs), taxis, carshare services, rental vehicles, and light duty delivery vehicles into the operational RUC program. However, within the 10-year timeframe, all light duty passenger vehicles are migrated into the operational RUC program. This scenario represents a tempered approach to RUC transition and will initially present less strain and challenges for states than the Full Replacement scenario. This gradual approach to transition will utilize a subset of drivers to slowly develop an operational RUC program and then transition to a larger operational RUC program that includes all vehicles. Some of the key considerations and challenges, and recommendations relative to each evaluation category are identified below:

- **Supports Easy Motorist Migration:** This scenario provides the highest degree of ease when migrating motorists. Fleets comprise a much smaller percentage of the overall motorist community and as such, a migration can be easily scaled and rolled out to a much smaller pool of vehicles.
    - **Challenges:** While some common challenges exist with the timely and easy migration across each scenario, the challenges with migrating fleet vehicles are considerably less. The biggest challenges will be with establishing consistent reporting across disparate technologies and fee collection systems. States may also need to establish new contracts with fleet companies to collect RUC on their behalf thus posing additional challenges.
    - **Recommendations:** Leverage existing collection and reporting processes to the fullest extent possible. Offer grants or zero interest loans to companies to successfully migrate to a RUC.
- **Degree of Equity Promotion:** Equity considerations will have little to no impact with a fleet conversion, but this scenario does offer more time for a state to engage specific communities and promote the RUC concept while fleet programs are migrated.
    - **Challenges:** Fleet owners will feel they are being treated unfairly as they are providing positive economic impacts. Most fleet systems are also limited in the tax reporting they do, as most of their transactions are considered fees.

- **Recommendations:** Engage fleet owners to create specific messaging around RUC. Create campaigns specific to each fleet owner that exploit their investment in improving the highway infrastructure. Offer potential tax subsidies or savings for enrolling in RUC.

- **Effectiveness in Replacing Motor Fuel Tax (MFT) Revenues:** This scenario will initially provide little to no impact to existing revenues and may provide less revenue if rates do not exceed those equal to the motor fuel tax**.**
  - **Challenges:** The biggest challenge with this scenario will be creating a sustainable, positive, revenue stream in the initial few years of implementation. Further, RUC on fleets may increase costs to consumers which could have a ripple effect across many other economic areas.
  - **Recommendations:** Explore rate structures that encourage fleet participation without negatively impacting their involvement and help offset any costs associated with technology or process improvements. Create grants or zero interest loans to help offset costs and support immediate positive cashflows.
- **Supports Multiple Technologies:** Under this scenario, technology choices will be limited to those chosen by fleet providers.
  - **Challenges:** The biggest challenge facing technology options is the need to clearly, accurately, and reliably collect RUC and report data without proving cost prohibitive to fleet owners.
  - **Recommendations:** Create a set of functional requirements and standards compliance that must be followed regardless of the options used. Allow fleet owners to meet the criteria using their own preferred technology. Explore grants or zero interest loans to support technology refresh for fleet owners. Explore options to integrate RUC with existing fleet service capabilities, like cellular data plans, utilities, tolling, in-vehicle telematics, or other possibilities.
- **Leverages Existing State Organization:** For the time that RUC is initially leveraged on fleets, there are very little organizational complexities, and the program should be easily accommodated using existing contracting and tax administrative staff.
  - **Challenges:** The biggest organizational challenge faced under this scenario is the need to integrate new processes and staff as the program evolves to a larger rollout. While new organizational challenges will be posed during the fleet rollout, they are anticipated to be minimal and will rely heavily on existing processes and staff.
  - **Recommendations:** Leverage existing processes, staff, and systems who are already well-versed in fleet revenue programs, such as fleet licensing. Incrementally ramp up staff and capabilities as new vehicle classes are migrated into the RUC program.

- **Supports a Cost-Effective Deployment:** The migration of fleets to a RUC program poses the lowest deployment costs of all scenarios. The transition to a full implementation over time will certainly be costly, but those costs are anticipated to be spread out over several years and can be methodically controlled as new vehicles enter into the RUC program.
    - **Challenges:** Most of the costs associated with this scenario will revolve around establishing new contracting mechanisms, possibly establishing grants or zero interest loans for systems refresh efforts and working with fleet owners to deploy communications to their customers.
    - **Recommendations:** Leverage existing fleet systems and processes. Collaborate with fleet owners to share the costs of communicating RUC to their customers.
- **Encourages Simple Public Communications:** Public outreach and communications under this scenario will be the responsibility of the fleet owners. While state involvement is needed to ensure consistent and accurate messaging, the low number of stakeholders needing to be engaged proves the simplest of scenarios.
    - **Challenges:** The biggest challenge with public communications under this scenario is ensuring that fleet owners are providing messaging that is consistent with state direction. Some fleet owners may undermine the messaging to promote their own business priorities which may derail longer term communications plans.
    - **Recommendations:** Work with fleet owners to establish consistent messages. Develop shared communications content and create ads and other state-owned materials that can be promoted by the fleet owners.
- **Degree of Risk Aversion:** This option provides the least amount of risk of all the scenarios. While risks are anticipated, they are expected to be easily addressed which allows for a more methodical approach to risk management as new vehicle classes are migrated to RUC.
    - **Challenges:** The biggest challenge to this scenario is acceptance by fleet owners, and the enforcement of unpaid RUC.
    - **Recommendations:** Clear communications and collaboration with fleet owners will help mitigate risks. Also, placing the onus of collection on the fleet owner with the ability to easily impose registration liens may also help address enforcement risks.

10 FUTURE CONSIDERATIONS

The path to full implementation of an operational RUC program will be filled with a variety of challenges and actions that states must consider as they look to install a RUC system. However, once operational RUC programs are in place, there are several future considerations too. The emergence of mobility marketplaces, where all services and user fees are combined under a single platform, will look to integrate with RUC systems. The widespread adoption of electric vehicles has the potential to disrupt revenues streams and as a result incentivize policy makers to take action through the implementation of an operational RUC program. New and emerging technologies will continue to allow states to provide services in a more efficient manner that provide additional convenience for users, but these services will require adaptable and flexible RUC systems to accommodate future integration of innovative technologies.

10.1 MOBILITY MARKETPLACE

In contemporary society, customers have grown accustomed to an increasing level of convenience in all facets of life. Transportation is no exception. The Mobility Marketplace will offer users of the transportation system the ability to access all modes of transportation through a single platform. Whether one is purchasing tickets for transit, commuter rail, or micro mobility options (i.e., e-bikes, electric scooters, electric skateboards, etc.), users of the system will be given the flexibility to make these transactions in a seamless fashion from a single application. However, the Mobility Marketplace is broader than just access to the various modes that make up the surface transportation system. Included within the Mobility Marketplace will also be the ability to for consumers to pay user fees such as RUC. RUC pilots across the country have consistently demonstrated that convenience is a gateway to user acceptance and breads higher levels of satisfaction. From this perspective, the integration of RUC fee payment into the Mobility Marketplace will compliment features that users will likely welcome.

10.2 ELECTRIC VEHICLE PROLIFERATION

The emergence of electric vehicles, and other highly fuel-efficient vehicles, has created long-term challenges for the sustainability of the motor fuels tax. The growth in electric vehicles will continue to be a disruptive factor and impede the ability of the motor fuels tax to adequately fund the surface transportation system. More recent versions of previous electric vehicles models have longer lasting battery life that can be 20 to 100 percent higher than their previous counterparts. In addition, battery costs have decreased by more than 85 percent since 2010. Beyond lower cost batteries and extended battery life, which has reduced range anxiety, automakers have

expanded electric vehicle charging options across models and vehicle types. Moreover, electric vehicles adoption has also been supported by ambitious policies and subsidies. Furthermore, some states, such as California, have announced the plans to stop the sale of all gasoline-powered vehicles. As such, it is reasonable to assume that electric vehicle adoption will increase significantly in the coming years and put pressure on the already diminishing returns of the motor fuels tax.

10.3 EMERGING TECHNOLOGIES

Technologies for collecting, processing, and transmitting road usage data will continue to evolve. RUC pilots have often used aftermarket devices such as OBD-II dongles or smartphones to collect, process and transmit road usage data. However, embedded telematics systems provide an opportunity to collect road usage data automatically without the use such devices. Furthermore, the systems will be less prone to tampering and evasion. In-vehicle telematics will improve as more systems are factory installed as a standard feature, and automated vehicle applications may one day be standard as well. And unknown technologies of the future may unlock even further possibilities. RUC systems should be structured so that they facilitate, or are at least flexible to, technology innovation. The desired flexibility of the operational RUC system should be established during the pre-implementation phase. Subsequent implementations should have flexibility accounted for in technical specifications and business requirements.

11 CONCLUSION

This Ten-Year Implementation Plan has provided high-level steps, recommendations, considerations of policy trade-offs, and best practices for states to engage when advancing through the RUC America tiers and implementing their own operational RUC programs. Additionally, the Ten-Year Implementation Plan has identified many of the challenges that states may experience when advancing across RUC maturity tiers and when they begin deploying, operating, and administering their own operational RUC programs. As each state has their own unique processes, policies, and administrative rules, the recommendations provided in this Ten-Year Strategic Plan should be customized to best fit each state's unique operating environment.

Through the development of the Ten-Year Implementation Plan several key takeaways and observations have been identified. These key takeaways represent the insights to be taken into consideration as states move to implement operational RUC programs. These key takeaways include:

- **Variability Among States:** Due to varying and often disparate political sensitivities, economic impacts, governance structures, and socioeconomic differences amongst populations, there is not a single path for each state to take with regards to deploying an operational RUC program.
- **The Need for Standards:** National data security standards will be necessary to achieve interoperability amongst states
- **Public Outreach and Education:** Public outreach and education will be essential, especially when establishing a common understanding of the current funding model and why it is no longer sustainable, why RUC is a feasible alternative, and what the public's priorities are for a RUC system in their state.
- **Dispelling Common Myths:** Common myths associated with RUC, such as privacy implications, administrative complexities, high operating costs, and rural/urban equity can be addressed through education.
- **Role of the State DOT:** The role of the DOT could initially be as key administrators for operational RUC programs, but that role should move to other departments such as revenue or motor vehicles as the program takes on more vehicles and categories.
- **Start with Electric Vehicles:** Electric vehicles are an obvious first choice for initial implementation of an operational RUC program, but states should also explore how and when to best integrate other vehicle classes.

- **RUC Rates:** RUC rates can apply uniformly to all passenger vehicles or could vary based on vehicle weight, emissions, or fuel economy depending on a state's policy priorities

- **Legislative Engagement:** Strong working relationships with legislators and Governors across multiple parties is necessary to obtain legislative approval for RUC.

- **The Role of the Federal Government:** Guidance from the national RUC pilot program will play a key role in determining how states will deploy their own RUC solutions.

- **Regional Interoperability:** Regional interoperability is necessary and IFTA provides a model for states to consider due to its adherence to common standards which allow for consistency in interstate revenue reciprocity.

- **Experience Breeds Acceptance:** With RUC, experience breeds acceptance. States who have previously deployed public-facing pilot programs are more likely to garner stronger public acceptance of RUC.

- **Anticipate and Adapt to Evolving Technology:** Technologies for collecting, processing, and transmitting road usage data will continue to evolve. In-vehicle telematics and automation will continue to advance as more systems are factory installed as a standard feature. States should act to develop RUC systems that are structured so that they facilitate, or at a minimum be flexible to, technology innovation.

As RUC America and its member states to continue to deploy operational RUC programs, states across the country will be keen to observe their breakthroughs as they blaze "New Paths to Road Funding." After all, RUC America is uniquely suited, as nationally recognized as leaders in advancing the research, development, and demonstration of RUC as an alternative to the motor fuels tax system, to create a Ten-Year Strategic Plan for the implementation of RUC. The implementation of operational RUC programs will come with challenges, but those challenges can be met with the actions and recommendations contained within this Ten-Year Implementation Plan.