RUC AMERICA
New paths to road funding

RUC Taxation Payment Structure

February 2024

Table of Contents

List of Figures

List of Tables

1. Background

1.1. Motivation

The collection of RUC payments, based on vehicle mileage, may be administered by state tax authorities. However, the inevitably higher cost of collecting mileage fees, when compared to the gas tax, presents an administrative challenge for states pursuing implementation of a RUC program. Integrating the collection or distribution of RUC mileage fees with a state's current taxation services may lower this administrative burden. It may also offer solutions for other programmatic challenges including, but not limited to, mid-year vehicle sales, credits for fuel taxes paid, interstate or federal disbursements and local road dues.

The goal of the project is to investigate the capability and viability for state or other tax authorities to collect RUC mileage fees for registered vehicles through various collection structures including vehicle registration, income or sales tax, safety or emissions inspections and other potential touchpoints with drivers including vehicle insurance and public utilities with a specific focus on reducing the cost of administration.

1.2. Taxes, Fees, and Vehicle-related Transactions

During November 2022 RUC America Workshop, the research team worked with representatives from participating states to determine the list of potential collection structures to be included in this research:[1]

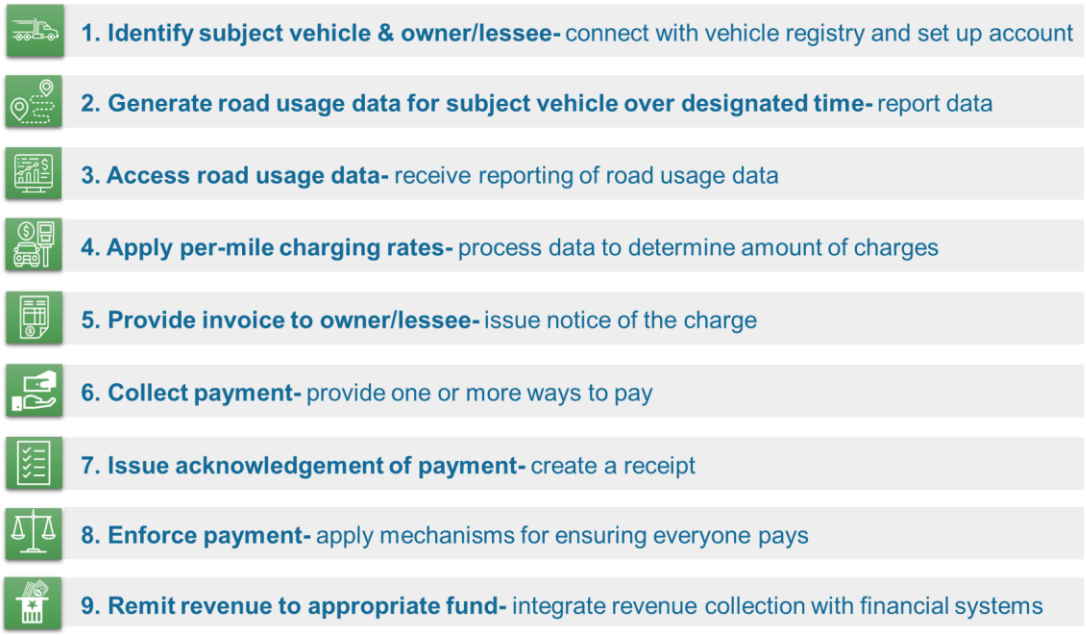
- Vehicle registration renewal
- Tolls
- State income tax
- Property taxes
- Sales tax
- Utilities
- Vehicle inspections
- Emissions inspections
- Vehicle title transfers
- Auto insurance

1.3. RUC Functions

The administration of a RUC can be broken down into nine core functions (Figure 1). The potential collection structures were evaluated in its ability to fulfill each core function.

[1] Participating states include California, Hawaii, Idaho, Montana, Nevada, New Mexico, Oklahoma, Oregon, Pennsylvania, South Dakota, Texas, Utah, Washington, Wyoming

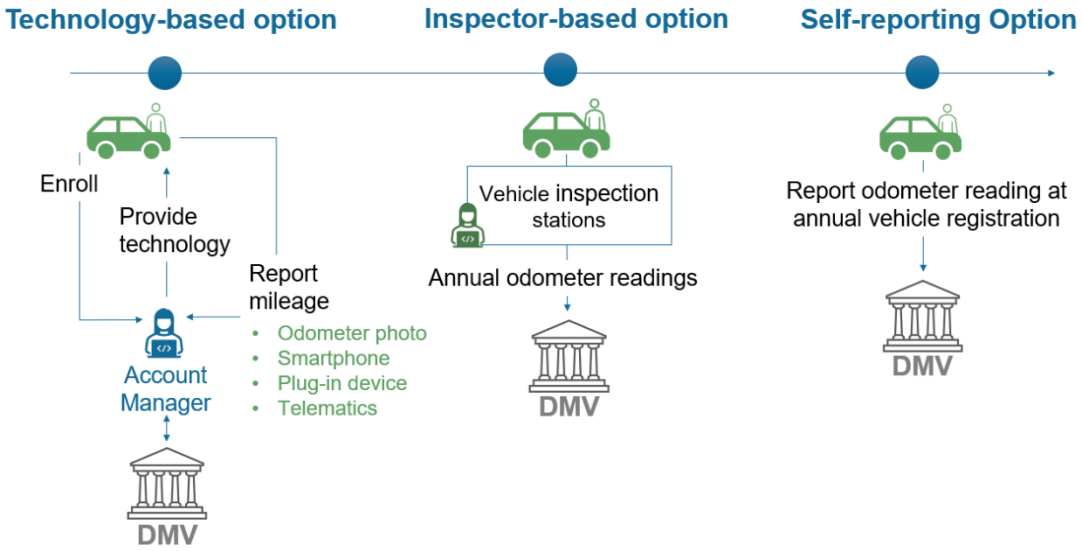
Figure 1: Core Functions of RUC Administration



1.4. Mileage Reporting Methods

How the nine core RUC functions are carried out can be significantly different depending on the state's chosen mileage reporting method and implementation strategy. Mileage reporting methods range from technology-based options such as original equipment manufacturer (OEM) in-vehicle telematics or plug-in mileage reporting devices to low-tech (i.e. self-reported) options (Figure 2).

Figure 2: RUC Mileage Reporting Methods

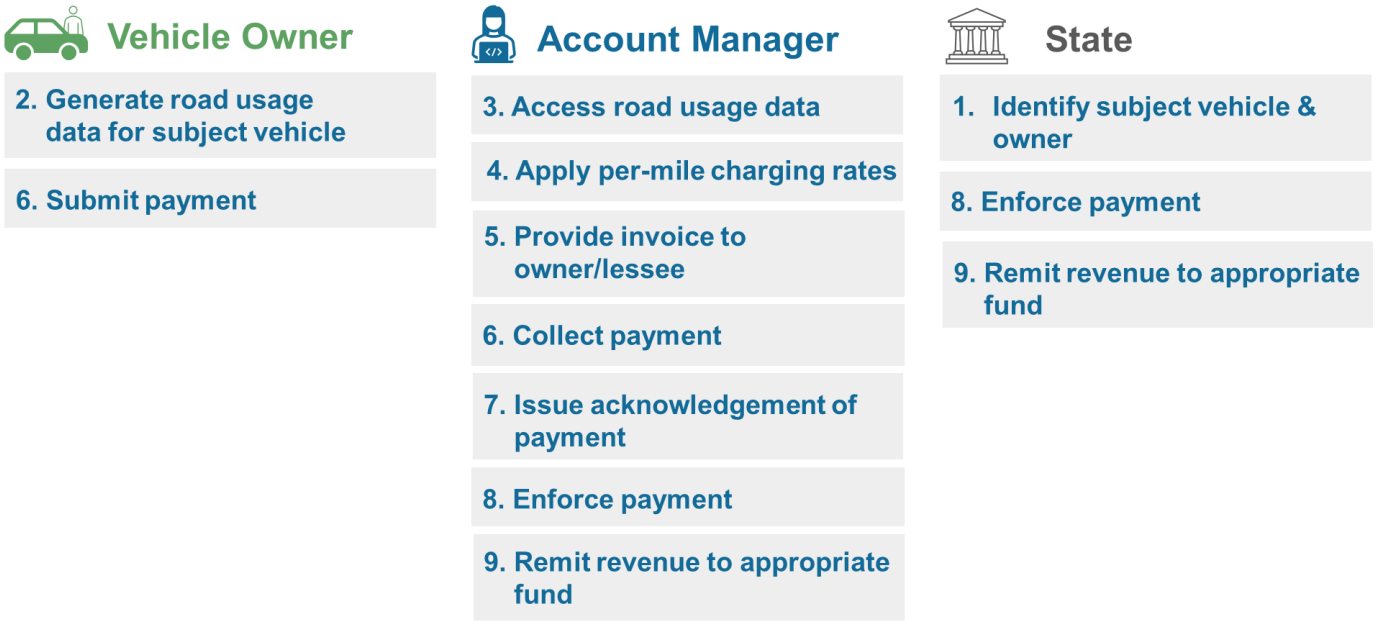


1.4.1. Technology-based options:

Technology-based mileage reporting options include OEM in-vehicle telematics, smart phone mileage reporting apps, location-enabled devices that plug in to a vehicle's onboard diagnostic (OBD-II) port and report mileage, and OBD-II plug-in devices that report mileage but do not include a GPS and cannot report a vehicle's location. With technology-based options, 3rd party commercial account managers (CAMs) that provide the technology, also manage customer accounts, issue invoices, collect payments, and remit funds to the state (Figure 3).

Location-enabled mileage reporting devices (OBD-II plug-in devices or smart phone apps) capture both mileage and location simultaneously, allowing determination of precisely which jurisdiction the mileage occurred.

Figure 3: Functions for Technology-Based Options



Several states have pilot tested technology-based options. Oregon and Utah have implemented technology-based options in their respective RUC programs.

1.4.2. Inspector-based options:

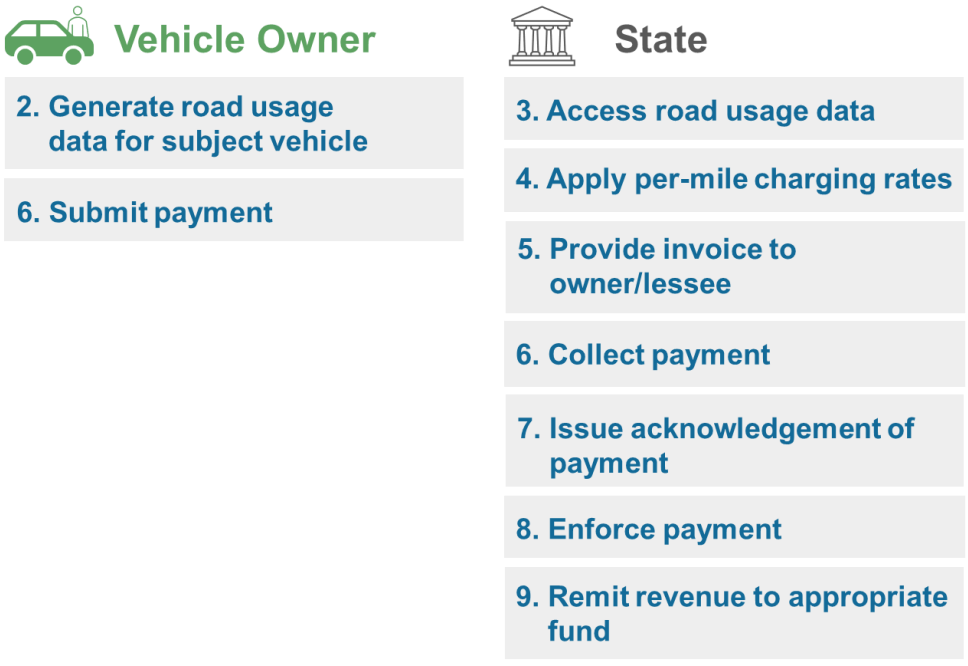
An inspector-based mileage reporting is a lower-tech, manual approach that relies on an official odometer reading taken during a vehicle inspection (Figure 4). This approach may work well in states that have mandatory annual vehicle or emissions inspections in which an odometer reading is taken. Hawaii, for example, is implementing this approach.

Figure 4: Functions for Inspector-Based Options

1.4.3. Self-reporting options:

Under a self-reporting option, drivers report mileage directly to the state (Figure 5). Washington has pilot-tested a version where odometer readings are self-reported during vehicle registration renewals with the option to attach an odometer photograph as additional evidence.

Figure 5: Functions for Self-Reporting Options



Self-reporting and inspector-based mileage reporting methods do not allow for reporting of mileage by location or jurisdiction. interoperable between jurisdictions because there is no way verify the location in which a vehicle's miles were driven.

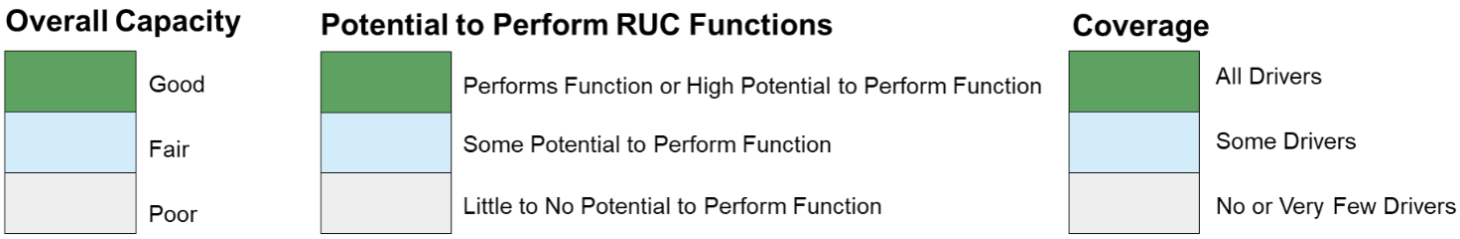
Many of the approaches explored in this analysis are focused on lower-tech self-reporting options as they tend to be less costly and simpler to implement.

1.5. Framework

This research, which began with a pre-workshop questionnaire sent to participating states, aims to assess the potential of each of the identified taxes, fees, or vehicle transactions to fulfill each of the nine core RUC functions.

States with similar practices for a given tax, fee, or vehicle transaction are grouped together and are assessed on their potential to fulfill each of the nine core RUC functions **(Potential to Perform RUC Function),** as well as their **overall capacity** to utilize the tax, fee, or transaction for efficient RUC administration. Additionally, the **coverage** of each tax, fee, or transaction is assessed based on how many drivers have a touchpoint with it (Figure 6).

Figure 6: Tax, Fee, or Transaction Assessment System



The number of states grouped together by their "overall capacity" to apply a collection structure to RUC depends on how much a given collection structure varies from state to state in terms of its relevance to performing any of the nine core RUC functions. For some collection structures, all participating states may be in one group as there is little difference state to state. Examples include utility billing, automotive insurance, and vehicle title transfers. For other collection structures, such as emissions and safety inspections, there may be up to four groups of states.

Section 2.0 presents the overall capacity for each participating RUC America state to leverage an existing collection structure for administering RUC, while Section 3.0 describes each collection structure's capacity to fulfill each of the nine core RUC functions.

2. Summary of Findings

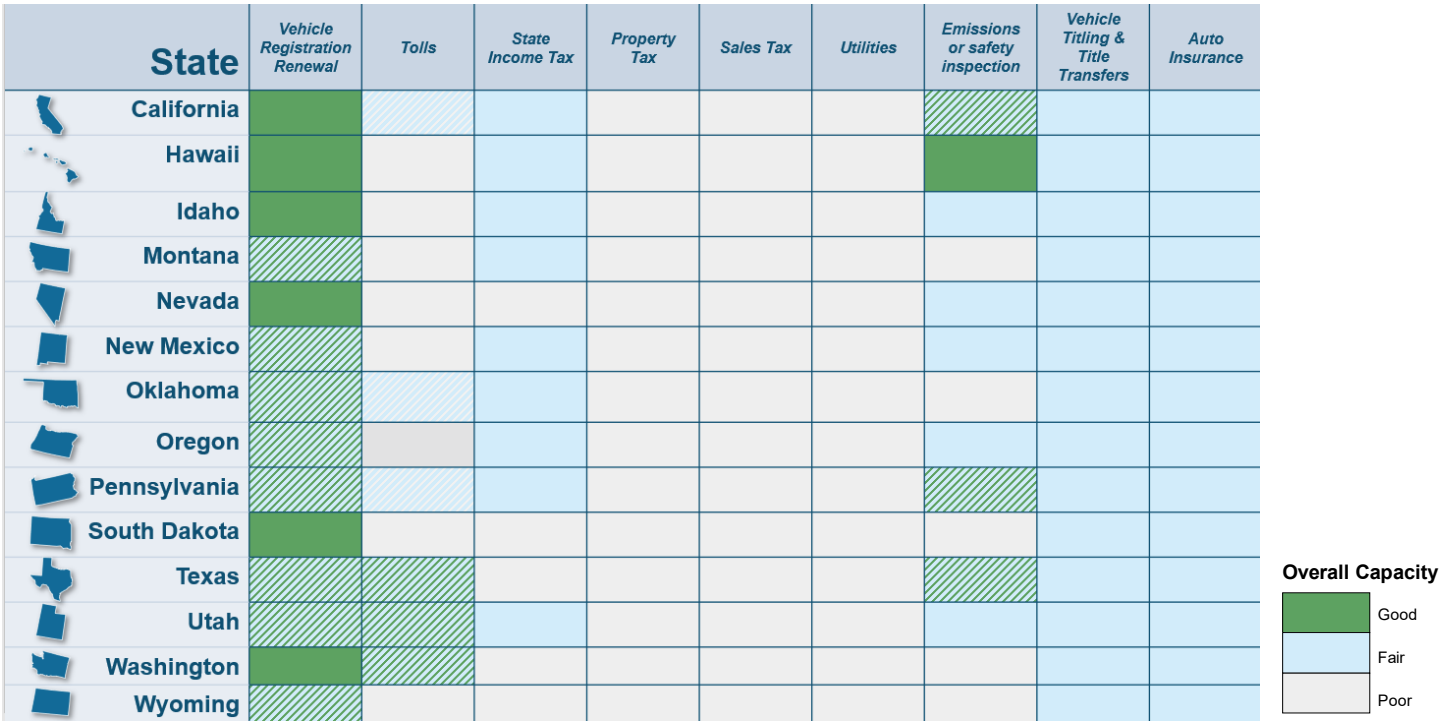
Figure 7 summarizes the assessment of each collection structure's overall capacity to contribute to administer a RUC by State.

All of the RUC America states analyzed have at least one suitable existing collection structure that could be used to administer RUC. For example, the vehicle registration and registration renewal process performs relatively well in all states as it is a vehicle-related transaction that is a prerequisite for legal operation of a vehicle on public roads in all states (Figure 7; Section 3.1.1).

Not all collection structures analyzed are suitable for RUC. However, in some cases, a tax, fee, or vehicle transaction touchpoint may have potential to fulfill one or two of the nine core RUC functions, which when pieced together with other processes could help reduce the cost of RUC administration. For example, required odometer disclosures during vehicle titling and title transfers cannot support RUC on their own, but may provide an additional data point for mileage audits at minimal marginal cost (Section 3.4.2)

Other processes identified during the November 2022 RUC America workshop such as property taxes, sales taxes, and utility payments have little potential to fulfill any of the core RUC functions because they only offer partial coverage of the full fleet of registered vehicles in a state, have no connection to the vehicle or vehicle owner, and have no direct enforcement mechanism.

Figure 7: Overall Capacity of Collection Structure to Administer RUC By State



3. Analysis of Collection Structures

This section defines and describes each of the collection structures and also presents the assessments of each collection structure by RUC function. The individual assessments are then aggregated into an Overall Capacity assessment. Factors that determine the Overall Capacity for a given state to leverage an existing collection structure to administer RUC include the existence or prevalence of a given collection structure in that state, the percent of drivers that interact with the collection structure, and how many of the nine core RUC functions can be performed by the collection structure.

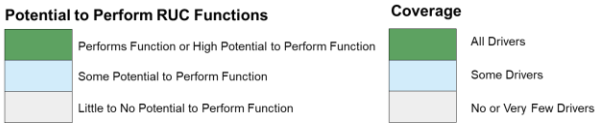
3.1. Vehicle-Related Taxes and Fees

Vehicle-related taxes and fees are those that are associated with the vehicle. This means that not only would the association of a RUC with these taxes and fees be more natural and intuitive to the user, but from a systems perspective, the business processes and data requirements are most likely the most similar. The two most common vehicle-related taxes and fees for light vehicles are vehicle registration renewal and tolls.

3.1.1. Vehicle Registration Renewal

Figure 8: Assessment of the vehicle registration renewal process as a means of administering the nine core RUC functions

States	*Tax Base*	*Coverage*	*Function 1* Vehicle Owner Identification	*Function 2* Generate Road Usage Data	*Function 3* Access RUC Data	*Function 4* Apply per-mile rate	*Function 5* Provide Invoice	*Function 6* Collect Payment	*Function 7* Issue Receipt	*Function 8* Enforce Payment	*Function 9* Remit Payment	*Overall Capacity*
CA, HI, ID, NV, SD, WA	All Registered Drivers											
MT, NM, OK, OR, PA, TX, UT, WY	All Registered Drivers											



A RUC that tightly interfaces or is directly integrated with the vehicle registration renewal process performs well across all the nine core RUC functions and, overall, shows the greatest potential to efficiently administer a RUC program relative to the other taxes, fees, and transactions assessed (Figure 8). Under such a system, motorists could report and pay for the previous year's mileage while renewing their vehicle registration. Washington is testing a self-reported vehicle registration-based RUC system.

Identifying vehicles and owners is a core function of State Departments of Motor Vehicles (DMVs) and Departments of Licensing (DOLs). DMVs and DOLs have existing processes to issue registration renewal notices and collect payments from motorists.

Additionally, a vehicle registration-based RUC has some degree of built-in enforcement. As valid registration is required to legally operate a vehicle on public roads, proof of registration could be withheld until RUC is paid.

This assessment groups states into two categories of "overall readiness" to leverage the vehicle registration renewal process for RUC, however for this collection structure the differences are not significant. States in the first group have both an annual vehicle registration renewal cycle, while states in the second group have multi-year registration cycles as standard or as optional.

California, Hawaii, Idaho, Nevada, South Dakota, and Washington all have one-year registration renewal cycles. Oregon has standard two-year (and four-year for new vehicle) registration cycles, while New Mexico and Pennsylvania have options for two-year renewal cycles. In Montana, registration fees can be paid quarterly, annually, bi-annually, or with a one-time permanent registration. The fee frequency entirely depends on the vehicle, residence, and statute.

Multi-year registration cycles do not necessarily preclude a state from using a vehicle registration-based RUC system. RUC could be reported and paid biennially, or registration renewal cycles could be adjusted to accommodate RUC.

Odometer readings taken by DMV or DOL agents are also not critical to a self-reported vehicle registration-based RUC system. Rather, they could provide an additional data point that could be relied on to perform audits. There is still a high degree of enforcement built-in as registration is required to legally operate a vehicle on public roads. Even in states where odometer readings are taken by the DOL/DMV, they are often taken intermittently, such as during title transfers for example. Additionally, there are often many exempt vehicles, and when an odometer reading is required, it is often self-reported and not necessarily verified by DOL/DMV staff.

Table 1 provides a function-by-function analysis of the potential for vehicle registration renewals to be leveraged for RUC.

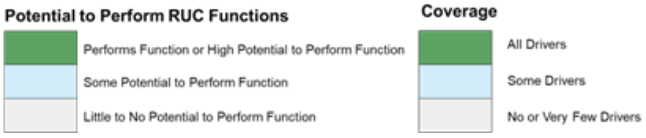
Table 1: Vehicle Registration Renewal – Detailed Assessment by RUC Function

RUC Function	Potential for Vehicle Registration Renewal to Fulfill RUC Function
1. Vehicle & Owner Identification	Core function of DOL/DMV systems is identifying vehicles and drivers.
2. Generate Road Usage Data	Under a vehicle registry-based system, vehicle owners could potentially self-report mileage data, or utilize an in-vehicle device to automatically calculate road usage data. Reporting of odometer data is the responsibility of the individual motorist, while the DOL/DMV accesses the mileage data (Function 3).
3. Access RUC Data	Drivers could self-report mileage to DOLs or DMVs during the registration renewal process.
4. Apply per-mile rate	Under a flat RUC rate, DOLs or DMVs could apply the per-mile rate to the mileage data [VMT – Exempt Miles] * [Per-mile rate]. Some modifications required to existing systems to perform this function.
5. Provide Invoice	DOL or DMVs could provide invoices at the time of notice for registration renewal.
6. Collect Payment	RUC could be added as a line item to registration renewal fees, and vehicle owners could pay RUC online or at local DOL/DMV offices (or subagents) at the same time they pay for registration renewal.
7. Issue Receipt	RUC Charges could be added as a line item on DOL receipts for payment of registration fees.
8. Enforcement of Payment	Tying RUC to vehicle registration allows for some built-in enforcement. Valid registration is required to legally operate a vehicle on public roads. If RUC is wrapped into registration renewal fees, drivers would not be issued tabs if they do not pay their RUC.
9. Remit Payment	DOLs and DMVs are generally set up to remit vehicle licensing fees to their respective state Department of Revenue.

3.1.2. Tolls

Figure 9: Assessment of tolling as a means of administering the nine core RUC functions.

States	Coverage	Function 1 Vehicle Owner Identification	Function 2 Generate Road Usage Data	Function 3 Access RUC Data	Function 4 Apply per-mile rate	Function 5 Provide Invoice	Function 6 Collect Payment	Function 7 Issue Receipt	Function 8 Enforce Payment	Function 9 Remit Payment	Overall Capacity
CA, OK, PA, TX, UT, WA	Some Drivers in Regions with Toll Roads/Bridges										
HI, ID, NM, MT, NV, OR, SD, WY	No Drivers										



Among the participating RUC America states, only California, Oklahoma, Pennsylvania, Texas, Utah, and Washington have active toll facilities (Figure 9). However, because tolls are typically limited to specific corridors, not all drivers interact with this collection structure, particularly if they live in a region of the state without toll roads, bridges, or tunnels.

Many states have electronic toll facilities that detect vehicles via radio-frequency identification (RFID) tag or automated license plate recognition (ALPR) or license plate capture through video. Customers prepay a balance into an account, with tolls electronically deducted as users pass through toll collection points.

Plug-in mileage reporting devices previously pilot tested under technology-based RUC collections options are not currently capable of capturing toll events, and the technology used to capture toll events is not capable of capturing the distance traveled necessary for RUC. For example, Washington's Toll program, *Good To Go!*, currently uses RFID technology (and ALPR for unregistered users) to capture vehicle passages. For the moment, two separate mechanisms are required to capture the journeys but, in the future, opportunities for the use of a single device, such as an RFID tag embedded in a GNSS module could be explored.

Some inherent features of RUC and tolling will lead to operational differences in how the respective services are provided. Such differences will limit the potential for compatibility between the two systems. Tolling is based on discrete transactions where RUC is based on continuous usage. They are likely, therefore, to have different payment models, while the interaction between users and their service provider will also differ, particularly in relation to disputes. RUC may be post-paid, with the user getting invoices for the distance traveled in a given period. Tolls, on the other hand, are often paid via auto top-up, with deductions from a stored card on the account for each transaction.

At a very basic level, both systems require some coordination with and data from the DMV or DOL vehicle registry. Additionally, although RUC and tolling transactions must be calculated separately, they could be combined into one bill or statement for the customer to pay. There is some benefit for RUC in that it could share some of the administrative costs with tolling.

Table 2 provides a function-by-function analysis of the potential for tolls to be leveraged for RUC.

Table 2: Tolls - Detailed assessment by RUC Function

RUC Function	Potential for Tolls to Fulfill RUC Function
1. Vehicle & Owner Identification	Electronic tolling systems tie accounts to vehicles and vehicle owners.
2. Generate Road Usage Data	Odometer data is generated by the individual motorist, while the collection structure provides a way for the state (or commercial account manager) to accesses the mileage data (Function 3).
3. Access RUC Data	Tolling is generally set up to capture discrete transactions (e.g. a vehicle passing through a corridor) rather than continuous mileage data.
4. Apply per-mile rate	As tolling captures discrete transactions, not continuous mileage data, a RUC collection scheme that leveraged tolling would likely lack the necessary data to apply the per-mile rate to.
5. Provide Invoice	Electronic tolling systems can provide receipts for transactions and generate invoices as well.
6. Collect Payment	Electronic tolling accounts are generally tied to an account which is connected to a bank account or credit card with funds are deducted automatically for each transaction.
7. Issue Receipt	Electronic tolling systems issue receipts for transactions and in some cases, could be leveraged to issue receipts for RUC payments.
8. Enforcement of Payment	There is no direct enforcement mechanism between the collection of tolls and vehicle registration. Some states allow registration holds to be put in place when unpaid tolls exceed the payment terms.
9. Remit Payment	Tolling agencies could theoretically remit RUC revue to the state, however it would require additional accounting to ensure toll and RUC revenue stay separate.

3.2. Taxes

Given RUC is a replacement for the gas tax, many policymakers have asked whether leveraging other existing tax collection structures would be cost efficient. State income tax, property tax, and sales tax were assessed.

3.2.1. State Income Tax

Figure 10: Assessment of income tax as a means of administering the nine core RUC functions

States	Tax Base	Coverage	Function 1 Vehicle Owner Identification	Function 2 Generate Road Usage Data	Function 3 Access RUC Data	Function 4 Apply per-mile rate	Function 5 Provide Invoice	Function 6 Collect Payment	Function 7 Issue Receipt	Function 8 Enforce Payment	Function 9 Remit Payment
CA, HI, ID, NM, MT, OK, OR, PA, UT	Residents with Income Over Filing Threshold										
NV, SD, TX, WA, WY	N/A										

Potential to Perform RUC Functions

- Performs Function or High Potential to Perform Function
- Some Potential to Perform Function
- Little to No Potential to Perform Function

Coverage

- All Drivers
- Some Drivers
- No or Very Few Drivers

Nine U.S. states, including five of the participating RUC America states, have no state income tax. For these states, there is little potential for this collection structure to be utilized for RUC unless a theoretical future state income tax were designed from the outset to be compatible with RUC.

For the nine participating states that do have a state income tax, there is some potential to leverage the tax filing process to report mileage and collect RUC (Figure 10). Income taxes are set up to collect payments, issue receipt of payment, remit funds to the proper state agency in accordance with the state budget and enforce payment through potential audits. The perceived "seriousness" of income taxes may also increase voluntary compliance as opposed to a potential new and unfamiliar RUC collection mechanism.

Some modifications to tax forms would be required including space for filers to write in the VIN and odometer reading of all of the vehicles they own. Under such a scheme, it may take up to three years of mileage reporting before RUC could be collected:

- In year 1, a baseline odometer reading is established for each vehicle.
- In year 2, a second odometer reading provides an annual mileage figure to which the per-mile rate is applied.
- In year 3, RUC is paid with state income taxes based on the mileage accrued between years 1 and 2. Odometer readings are provided for year 3 and subsequent years indefinitely.

In the interim, the gas tax (or some other collection mechanism) would have to remain in place to continue collecting revenue.

One challenge with this approach is that it would be very difficult to account for gas taxes already paid unless drivers kept receipts of all gas taxes to deduct from the RUC already paid to avoid double taxation. Alternatively, states could offer a standard deduction based on the combined EPA-published fuel economy rating of the subject vehicle. This would require some interoperability with the EPA database of vehicle fuel economies, although this data is readily available for vehicles model year 1984 and newer and is updated frequently. An alternative solution would be required for vehicles model year 1983 and older.

Coverage of this collection structure is relatively high as it applies to any individual required to report earnings over the minimum threshold. Nonetheless, there are some drivers with no reportable income (e.g. unemployed drivers, very low-income drivers, teenage drivers). To report mileage and collect RUC from drivers with no reportable income, some additional collection mechanism may be required.

Table 3 provides a function-by-function analysis of the potential for state income tax to be leveraged for RUC.

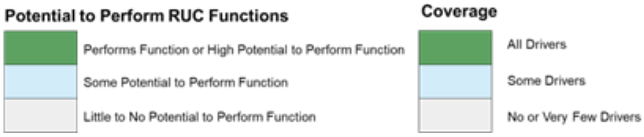
Table 3: State Income Tax - Detailed assessment by RUC Function

RUC Function	Potential for State Income Taxes to Fulfill RUC Function
1. Vehicle & Owner Identification	People are identified on tax forms via a social security number or EIN/tax ID. Some modification to the tax form would be required to include a space to provide the VIN, year, make, model, and odometer reading for each of the filer's vehicles.
2. Generate Road Usage Data	Odometer data is generated by the individual motorist, while the collection structure provides a way for the state to accesses the mileage data (Function 3).
3. Access RUC Data	Modifications to the tax form could be made for filers to fill in odometer readings. It may take multiple years of filing (i.e. one baseline odometer reading) before a per-mile rate could be assessed.
4. Apply per-mile rate	Instructions on how to apply the per-mile rate could be included with other tax form instructions and/or calculated automatically with tax filing software/services (e.g. TurboTax). Alternatively the per-mile rate and total amount owed could be calculated by the state based on the difference in miles accrued between years 1 and 2, then paid in year 3.
5. Provide Invoice	Tax forms (W2, 1099, etc.) are generally provided by the employer, not the state.
6. Collect Payment	The state is already set up to accept income tax payments/distribute refunds. The total RUC due could be included with the amount of income tax owed.
7. Issue Receipt	States generally send an acknowledgement that a tax payment/return has been accepted. This would include payment of RUC if bundled with income taxes.
8. Enforcement of Payment	States have existing processes for performing audits on income taxes. This would include RUC under a system in which RUC was paid with income taxes.
9. Remit Payment	State departments of revenue could remit the portion of funds collected from RUC to the appropriate agency (e.g. Department of Transportation).

3.2.2. Property Tax

Figure 11: Assessment of property taxes as a means of administering the nine core RUC function

States	Coverage	Function 1 Vehicle Owner Identification	Function 2 Generate Road Usage Data	Function 3 Access RUC Data	Function 4 Apply per-mile rate	Function 5 Provide Invoice	Function 6 Collect Payment	Function 7 Issue Receipt	Function 8 Enforce Payment	Function 9 Remit Payment	Overall Capacity
All	Property Owners										



Property taxes are a collection structure that has moderate coverage of vehicle owners (Figure 11). Among participating RUC America member states, home ownership rates range from 63.5% in Oregon to 71.9% in Wyoming. However as 28.1% to 36.5% of drivers are renters, a significant portion of the vehicle fleet would require some other mechanism to report and pay RUC.

While property taxes associate name with addresses, they are not tied to vehicles in any way, making RUC functions 1 (vehicle & owner identification), 2 (generate road usage data), 3 (access RUC data), and 9 (enforcement) impractical to achieve through this collection structure.

Property taxes are primarily levied by local entities like cities, counties, or school districts rather than the state. As the funds are generally used for local services and infrastructure, it is unlikely that payments collected through property taxes would be used to fund state transportation infrastructure maintenance.

Table 4 provides a function-by-function analysis of the potential for property tax to be leveraged for RUC.

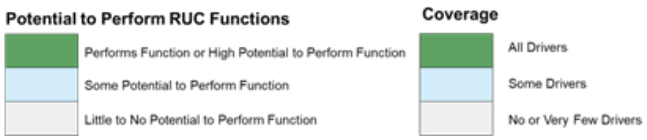
Table 4: Property Taxes - Detailed assessment by RUC Function

RUC Function	Potential for Property Taxes to Fulfill RUC Function
1. Vehicle & Owner Identification	Property taxes tie people to addresses, but are not associated with vehicles.
2. Generate Road Usage Data	Odometer data is generated by the individual motorist, while the collection structure provides a way for the state to accesses the mileage data (Function 3).
3. Access RUC Data	There is no practical way to collect vehicle information (VIN/year/make/model) and odometer readings through the property tax collection structure.
4. Apply per-mile rate	Local agencies that collect property taxes are not set up to apply per-mile rates to vehicles.
5. Provide Invoice	RUC due could theoretically be included as a separate line item with a notice of property taxes due.
6. Collect Payment	Local agencies are already set up to accept property tax payments. The total RUC due could be included with the amount of property tax owed.
7. Issue Receipt	Local agencies generally send an acknowledgement that a property tax payment has been received. This would include payment of RUC if bundled with property taxes.
8. Enforcement of Payment	There is little potential to enforce RUC payment through property tax collection as property taxes are not tied to vehicles or vehicle use.
9. Remit Payment	Property taxes are generally collected and spent at the local level.

3.2.3. Sales Tax

Figure 12: Assessment of sales tax as a means of administering the nine core RUC functions

States	*Coverage*	*Function 1 Vehicle Owner Identification*	*Function 2 Generate Road Usage Data*	*Function 3 Access RUC Data*	*Function 4 Apply per-mile rate*	*Function 5 Provide Invoice*	*Function 6 Collect Payment*	*Function 7 Issue Receipt*	*Function 8 Enforce Payment*	*Function 9 Remit Payment*	*Overall Capacity*
CA, HI, ID, NM, NV, OK, PA, SD, TX, UT, WA, WY	Most Transactions										
MT, OR	No State Sales Tax										



Of the RUC America member states all but Oregon and Montana have a state sales tax (Figure 12). Sales tax is a mechanism that has high coverage as it is applied at the point of sale on most transactions with the exception groceries and prescription drugs in most states. However, as sales tax has no significant connection to road usage, it is not a feasible mechanism to fulfill all nine of the core RUC functions.

Table 5 provides a function-by-function analysis of the potential for sales tax to be leveraged for RUC.

Table 5: Sales Taxes - Detailed assessment by RUC Function

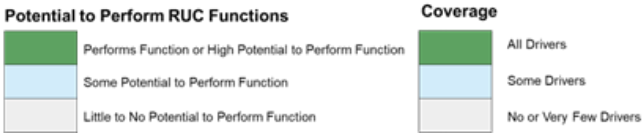
RUC Function	Potential for Sales Taxes to Fulfill RUC Function
1. Vehicle & Owner Identification	There is no practical way to associate vehicles and vehicle owners via a sales tax collection structure.
2. Generate Road Usage Data	Odometer data is generated by the individual motorist, while the collection structure provides a way for the state to accesses the mileage data (Function 3).
3. Access RUC Data	There is no practical way to collect vehicle information (VIN/year/make/model) and odometer readings through the sales tax collection structure.
4. Apply per-mile rate	There is no practical way to apply a per-mile-rate through a sales tax collection structure without also accessing RUC data (function 3).
5. Provide Invoice	There is no practical way to provide invoices through a sales tax collection structure.
6. Collect Payment	Sales taxes are collected at the point of sale on each transaction. There is no practical way to bundle RUC payment into these transactions.
7. Issue Receipt	There is no practical way to issue receipts for RUC paid through a sales tax collection structure.
8. Enforcement of Payment	There is little potential to enforce RUC payment through the sales tax collection structure as sales taxes are not tied to vehicles or vehicle use.
9. Remit Payment	Remitting RUC payments is not applicable to sales taxes as there is little potential to collect RUC through sales taxes.

3.3. Utilities

3.3.1. Utilities

Figure 13: Assessment of utilities as a means of administering the nine core RUC functions

States	Coverage	Function 1 Vehicle Owner Identification	Function 2 Generate Road Usage Data	Function 3 Access RUC Data	Function 4 Apply per-mile rate	Function 5 Provide Invoice	Function 6 Collect Payment	Function 7 Issue Receipt	Function 8 Enforce Payment	Function 9 Remit Payment	Overall Capacity
All	Homeowners and Many Renters										



Public utilities have relatively high coverage as all homeowners and many renters have some touchpoint with either electricity, natural gas, water, or waste management services. Utilities provide invoices to customers, collect payments, and issue receipts for payments at regular intervals and are sometimes set up to accept cash payments with minimal fees. Additionally, utilities have some existing relationship with the states and local jurisdictions as it is a heavily regulated industry. While utilities work collaboratively with state and local jurisdictions, regulations around utilities may make it infeasible to add a RUC on top of service charges.

In general, utility meters are read in person at regular intervals (although sometimes electronically via smart meter). However, because utilities are not optimized to collect RUC data and payments. Meter readers have an imperative to work efficiently, and stopping to collect odometer readings during meter reads would be impractical even under ideal conditions.

Additionally, there are typically dozens of individual electricity, natural gas, and water utility companies serving different regions of a given state, so while overall coverage is relatively high, it would take a patchwork of several different services to reach all drivers.

While utility bills tie homeowners to addresses, there is no connection to vehicles or road usage, and therefore no simple way to fulfill RUC functions 1 (vehicle & owner identification), 2 (generate road usage data), 3 (access RUC data), and 9 (enforcement) under this collection structure.

Table 6 provides a function-by-function analysis of the potential for utilities to be leveraged for RUC.

Table 6: Utilities - Detailed assessment by RUC Function

RUC Function	Potential for Utilities to Fulfill RUC Function
1. Vehicle & Owner Identification	Utilities associate users with addresses, however there is no practical way to associate vehicles and vehicle owners via a sales tax collection structure.
2. Generate Road Usage Data	Odometer data is generated by the individual motorist, while the collection structure provides a way for the state to accesses the mileage data (Function 3).
3. Access RUC Data	There is no practical way to collect vehicle information (VIN/year/make/model) and odometer readings through utility providers.
4. Apply per-mile rate	Utilities apply per-unit (BTU, gallon, kWh, etc.) to energy or water consumption, however, there is no practical way to apply a per-mile-rate through a utilities collection structure without also accessing RUC data (Function 3).
5. Provide Invoice	Utilities provide invoices at regular intervals to users, however they are not optimized to provide invoices for road usage.
6. Collect Payment	Utilities are set up to accept automatic or one-time online payments and, in some cases, can accept cash payments through partnerships with local brick and mortar stores or financial services companies (e.g. Western Union).
7. Issue Receipt	Utilities provides receipts that detail usage history and amount paid.
8. Enforcement of Payment	There is little potential to enforce RUC payment through utility providers as they are not connected to vehicles or vehicle use in a significant way.
9. Remit Payment	Remitting RUC payments to states would require additional accounting work on the part of utilities that is outside their scope of operations.

3.4. Vehicle Transactions

Vehicle-related transactions are a natural place to administer RUC as there are existing touchpoints between drivers and vehicle-related institutions (DMVs and DOLs, Insurers, etc.). The three transactions assessed as potential collection structures are emissions and safety inspections, vehicle titling and title transfers, and automotive insurance. From the perspective of the driver, a RUC tied to an existing vehicle transaction represent a change in billing rather than a "new tax" that requires additional action, thus increasing usability and compliance.

3.4.1. Emissions and Safety Inspections

Figure 14: Assessment of safety and emissions inspections as a means of administering the nine core RUC functions

States	Coverage	Inspection Type	Function 1 Vehicle Owner Identification	Function 2 Generate Road Usage Data	Function 3 Access RUC Data	Function 4 Apply per-mile rate	Function 5 Provide Invoice	Function 6 Collect Payment	Function 7 Issue Receipt	Function 8 Enforce Payment	Function 9 Remit Payment	Overall Capacity
HI		Safety										
CA, PA, TX		Emissions (CA, TX)/ Safety and Emissions in Select Counties (PA)										
ID, NM, NV, OR, UT		Emissions (Exemptions location, vehicle age, or vehicle type)										
MT, OK, SD, WA, WY		N/A										

Potential to Perform RUC Functions

- Performs Function or High Potential to Perform Function
- Some Potential to Perform Function
- Little to No Potential to Perform Function

Coverage

- All Drivers
- Some Drivers
- No or Very Few Drivers

In states that require emissions or safety inspections, inspection-based RUC reporting and payment schemes perform well across most of the nine core RUC functions. Inspections are a vehicle-related transaction that most drivers interface with in order to renew their vehicle registrations. Odometer readings are often already recorded during these transactions. As such, there is already an enforcement mechanism built into the process. Some states, including Hawaii, have studied and are implementing this approach to reporting RUC.

Vehicle safety inspections in Hawaii are typically performed at privately owned and operated service stations. These inspection stations are certified by the State of Hawaii Department of Transportation and are authorized to perform safety inspections on vehicles. Odometer readings are recorded as part of the safety inspection process.

Most vehicles in Pennsylvania are required to receive emissions inspections with exceptions for vehicles less than one year old, and some antique vehicles. Odometer readings are taken during inspections in Pennsylvania, however, emissions inspection readings are captured on paper, but not readily accessible by Pennsylvania Department of Transportation (PennDOT)

other than audits. Some stations use electronic systems, although the majority of stations that use an electronic solution use a third party that does not share the information with PennDOT.

New Mexico, Nevada, Oregon, and Utah have testing programs, however it is limited to certain counties or regions. In Oregon, this includes the Portland metro region where much of the population resides, however newer vehicles and EVs are exempt from emissions testing. Odometer readings are taken during emissions testing, however these can be self-reported, or taken by an agent (Testing stations have both self-service stalls and ones with agents).

Idaho Montana, Oklahoma, South Dakota, Washington, and Wyoming have no current inspection or emissions testing program.

Table 7 provides a function-by-function analysis of the potential for emissions and safety inspections to be leveraged for RUC.

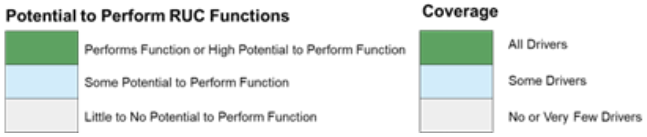
Table 7: Emissions and Safety Inspections - Detailed assessment by RUC Function

RUC Function	Potential for Emissions and Safety Inspections to Fulfill RUC Function
1. Vehicle & Owner Identification	As emissions or safety inspections are required in many states or portions of states before obtaining registration renewal, identifying vehicles and owners is a key component of the inspection process.
2. Generate Road Usage Data	Odometer data is generated by the individual motorist, while the collection structure provides a way for the state (or a third party inspector) to access the mileage data (Function 3).
3. Access RUC Data	Odometer readings are frequently taken as a part of the inspection process.
4. Apply per-mile rate	Inspection stations could apply the per-mile RUC rate to the mileage accrued since the last inspection or provide the mileage data to the state so that they could apply the per mile rate.
5. Provide Invoice	An invoice could be provided at the time of the inspection for mileage accrued since the last inspection.
6. Collect Payment	Many inspection stations are already set up to collect payment for the inspection. RUC could be added as a separate line item.
7. Issue Receipt	A receipt for RUC paid could be issued along with proof of passing the safety/emissions inspection.
8. Enforcement of Payment	There is some degree of built-in enforcement through the emissions/safety inspection process as passing inspection is required to obtain registration renewal.
9. Remit Payment	Inspection stations generally have an existing relationship with the state or in some cases are run by the state, which may make remitting payments simpler than other collection structures explored.

3.4.2. Vehicle Titling & Title Transfers

Figure 15: Assessment of vehicle titling & title transfers as a means of administering the nine core RUC functions

States	Coverage	Function 1 Vehicle Owner Identification	Function 2 Generate Road Usage Data	Function 3 Access RUC Data	Function 4 Apply per-mile rate	Function 5 Provide Invoice	Function 6 Collect Payment	Function 7 Issue Receipt	Function 8 Enforce Payment	Function 9 Remit Payment	Overall Capacity
All											



Odometer disclosures during the transfer of vehicle ownership is Federally mandated by the Motor Vehicle Information and Cost Savings Act. This law requires that the seller of a vehicle provide an accurate odometer reading at the time of sale and that the buyer acknowledge this reading. This includes new vehicles purchased from a dealership. As such, the coverage of this vehicle transaction is relatively high given that every registered vehicle should have at least one odometer disclosure statement, and potentially additional odometer disclosure statements depending on how many times the vehicle changes hands.

Vehicles ten model years or older are exempt from this requirement, however. A vehicle owned by a single owner for many years may only have one reading of very low mileage from the vehicle rolled off the dealership floor. Additionally, when a title transfer does occur within the first 10 years of a vehicle's life, the odometer disclosure is typically self-reported and rarely verified by a DOL or DMV official. Even if odometer disclosure are verified, title transfers are relatively infrequent, and only occur when ownership changes, making it difficult to use as an ongoing data source to associate miles driven with a particular driver.

While vehicle title transfers have little capacity to fulfill most of the core RUC functions, where odometer disclosures do exist, they represent an additional data point that could be used by auditors to check for discrepancies and enhance enforcement at little marginal cost. While odometer disclosures from title transfers alone cannot be relied on for enforcement, it is an existing process that can be potentially leveraged to reduce that cost.

Table 8 provides a function-by-function analysis of the potential for title transfer to be leveraged for RUC.

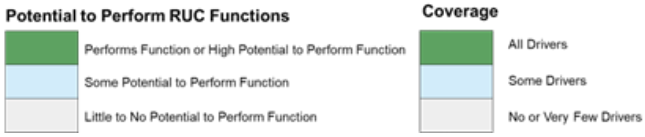
Table 8: Title Transfers - Detailed assessment by RUC Function

RUC Function	Potential for Title Transfers to Fulfill RUC Function
1. Vehicle & Owner Identification	Tying vehicles to owners is the core function of vehicle titling.
2. Generate Road Usage Data	Odometer data is generated by the individual motorist, while the collection structure provides a way for the state to access the mileage data (Function 3).
3. Access RUC Data	Odometer disclosures are required for vehicles less than 10 years old.
4. Apply per-mile rate	Title transfers typically require the signatures of the buyer and seller on a form that is then submitted to the DMV/DOL. It is not practical to apply a per-mile RUC rate during this process.
5. Provide Invoice	It is not feasible to provide invoices during the title transfer process as it is primarily used as a document confirming the transfer of ownership of a vehicle.
6. Collect Payment	It is not feasible to collect RUC payment during the title transfer process.
7. Issue Receipt	It is not feasible to issue receipts during the title transfer process as it is not feasible to collect RUC payment during this transaction.
8. Enforcement of Payment	Odometer readings obtained during title transfers could provide an extra data point for mileage audits and support enforcement efforts with little marginal cost.
9. Remit Payment	It is not feasible to remit RUC payment as RUC payments would not be collected during title transfers.

3.4.3. Automotive Insurance

Figure 16: Assessment of auto insurance as a means of administering the nine core RUC functions

States	Coverage	Insurance Premium Calculation	Function 1 Vehicle Owner Identification	Function 2 Generate Road Usage Data	Function 3 Access RUC Data	Function 4 Apply per-mile rate	Function 5 Provide Invoice	Function 6 Collect Payment	Function 7 Issue Receipt	Function 8 Enforce Payment	Function 9 Remit Payment	Overall Capacity
All		Plug-in Device										
All		Standard										



Liability insurance is required to legally operate a motor vehicle in most states, including all participating RUC America member states. As such, automotive insurance is a potential reporting and collection mechanism that covers all drivers. Moreover, tying vehicle owners to vehicles is a core component of insurers business model.

Additionally, insurers may have existing relationships with state DMVs and DOLs. Insurance agencies are often required to share information with the state DMV in order to verify that drivers have the required insurance coverage. In most states, when a driver purchases car insurance, the insurance company is required to electronically report your insurance information to the DMV, including the name of the insurance company, the policy number, and the effective dates of coverage. The DMV uses this information to verify that drivers are complying with the state's insurance requirements.

While insurers do not have the authority to enforce RUC compliance themselves, if a driver's insurance coverage lapses or is cancelled, your insurance company may also be required to notify the DMV. In some cases, the DMV may suspend a driver's license or vehicle registration if they do not have the required insurance coverage.

Some insurers offer customers the opportunity to install OBD-II plug-in devices in their vehicles in exchange for discounted rates. This practice may be particularly beneficial to a technology-based RUC reporting and payment collection method.

These onboard devices collect data on driving behavior (e.g. speed, acceleration, braking) to determine the driver's risk profile. Some telematics devices, particularly for low-mileage drivers may also read and report mileage in order to determine insurance premiums that are more in-line with actual vehicle use. There is some potential to leverage this process to report mileage for the purposes of RUC as well.

These types of devices tend to be opt-in only. Many customers may object to the perception of being "tracked" by their insurers. When customers do not have plug-in devices they are generally asked by their insurer to self-report odometer readings when first enrolling in the policy, and then relying on data from providers like CarFax thereafter. This arrangement may be less suitable to reporting mileage than the plug-in device approach as readings come at

irregular intervals, however they could still be used as an additional data point for potential audits.

Insurers are also set up to issue statements, collect payments, and issue receipts for their customers. At present, insurers likely have little incentive to take on the additional administrative work of collecting and remitting RUC payments on top of insurance premiums, however it is possible that they could be persuaded to do so if provided a service fee from the state.

Table 9 provides a function-by-function analysis of the potential for automotive insurance to be leveraged for RUC.

Table 9: Automotive Insurances - Detailed assessment by RUC Function

RUC Function	Potential for Insurers to Fulfill RUC Function
1. Vehicle & Owner Identification	A core function of insurers is identifying vehicles and drivers.
2. Generate Road Usage Data	Under a technology-based system, in-vehicle OBD-II plug in devices used to calculate insurance premiums for participating customers.
3. Access RUC Data	Some plug-in telematics devices record and report odometer readings to insurers to help calculate premiums.
4. Apply per-mile rate	Under a flat RUC rate, applying a per-mile rate is a relatively straightforward process. The biggest challenge would be accounting for gas taxes already paid by drivers. This can be considered by making an assumption about fuel consumed based on the EPA-published fuel economy of a given vehicle.
5. Provide Invoice	Insurers are already set up to provide invoices to the insured.
6. Collect Payment	Insurers are already set up to collect payments from the insured at regular intervals (on auto-pay if desired).
7. Issue Receipt	Insurers already set up to issue payment confirmations after each billing cycle.
8. Enforcement of Payment	While insurers have no power to enforce RUC payment, if RUC were bundled with insurance, and insurance is required to legally operate a motor vehicle on public roads, there is some degree of enforcement built-in.
9. Remit Payment	Insurers are not currently in the practice of remitting payments to the state, however, they do have some relationship with state DOLs and DMVs (e.g. confirming coverage of motorist). Perhaps the administrative process of collecting and remitting funds could be outsourced to private insurers for a fee.

4. Best Path Forward

While some RUC America member states have geographies or existing policies, systems, and processes that are particularly advantageous for implementing a RUC, all states analyzed possess the most critical building block for a RUC system—a registry of vehicles that ties the vehicle to its owner, and systems in place to collect registration fees on an annual or semi-annual basis.

The vehicle registration and registration renewal process, which all drivers interface with, already achieves many of the core RUC system functions in its current form, including identification of vehicle and owner, and built-in enforcement as valid registration is required to legally operate a vehicle on public roads. Other mechanisms already in place to provide invoices, collect payments, and issue receipts for vehicle registrations fees can be modified slightly to include each vehicle's annual RUC due as an additional line item.

The specific mileage reporting method, which can range from low-tech options such as manually entered, self-reported odometer readings (subject to audit for enforcement) and mileage recorded during vehicle inspections, to higher-tech options such as an in-vehicle device that transmits mileage data in real time (with or without location data), may vary depending on desired implementation timeline, level of up-front investment, geography, political climate, or public opinion, however vehicle registration remains the backbone of the system regardless the mileage reporting method.[2]

Table 10 describes the best existing processes RUC America states can leverage for a revenue-collecting road usage charge. The states are grouped into three categories—those with required annual vehicle registration renewal, those with multi-year registration renewal cycles as standard or optional, and those that require both an annual vehicle registration renewal as well as an annual vehicle inspection.[3]

[2] Manual reporting options may be quicker to implement and cheaper in the short-term, however more automated, higher-tech options may be administratively efficient once fully developed and used in mass despite higher up-front costs. In previous RUC studies and pilots, in-vehicle devices that automate mileage reporting were popular among some for their convenience, while others balked at perceived "tracking," particularly for location-enabled mileage reporting devices. In other RUC America states, like Hawaii, the geography greatly reduces or eliminates the potential for interstate travel, rendering location-enabled tracking devices less necessity for most use cases, although still useful for easily monitoring off-public road (RUC-exempt) mileage.

[3] Several states have some safety or emissions inspection process, however they typically apply to a subset of vehicles (by region or by vehicle type and model year) only. Hawaii's periodic motor vehicle inspection (PMVI) applies to all light-duty vehicles.

Table 10. Best Path Forward to Leverage Existing Processes for RUC

Best Path Forward	State(s)	Notes
Annual Vehicle Registration Renewal	California, Idaho, Nevada, South Dakota, Washington	Layer in desired mileage reporting method and add in RUC payment to registration renewal process
Multi-year (standard or optional) Vehicle Registration Renewal	Montana, New Mexico, Oklahoma, Oregon, Pennsylvania, Texas, Utah, Wyoming	Layer in desired mileage reporting method and add in RUC payment to registration renewal process. Multi-year registration cycles could be left as-is and have drivers pay for multiple years of RUC at once or amend legislation or administrative rules to change multi-year registration cycles to an annual registration cycle.
Annual Vehicle Registration Renewal & Vehicle Inspection	Hawaii	Odometer readings are collected and reported by inspectors during annual vehicle inspection while the vehicles are tied to owners through the state vehicle registry. Vehicle owners pay RUC as a part of their registration renewal.