



COUNTY-LEVEL RUC IMPLEMENTATION

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Contents

Preface	1
Executive Summary.....	3
Definitions & Abbreviations.....	6
1. Introduction	7
1.1. Purpose and Context	7
2. Background	8
2.1. Motivations for Considering a Road Usage Charge.....	8
3. Considerations for Collection of a County Road Usage Charge	11
3.1. Policy and Practical Considerations for a County Road Usage Charge Program.....	11
3.2. Integrating County Road Usage Charge into a State Road Usage Charge	14
3.3. County-Only Road Usage Charge	15
4. Process and Data Required to Collect Independent, County-Only Road Usage Charges.....	16
4.1. Vehicle and Responsible Party Identification	16
4.2. Generate Base Data for Subject Vehicle Over Designated Period	16
4.3. Access Vehicle Base Data	16
4.4. Apply Tax Rates.....	17
4.5. Notice of Charge to Vehicle Owner (Lessee).....	17
4.6. Collect Payment.....	17
4.7. Issue Acknowledgment of Payment.....	17
4.8. Enforce Payment.....	17
4.9. Remit Net Revenues	17
5. Financial Considerations for Replacing County Fuel Tax with County Road Usage Charge	18
5.1. The Nature of Driving in Hawaii’s Counties.....	18
5.2. Impact of Continuing Reliance upon the Fuel Tax	19



5.3. Comparison of Future Fuel Tax Revenues with Road Usage Charge Revenues	19
5.4. Net revenues	22
6. Conclusion	23

Tables

Table 1: Nine Essential Functions for Operation of a Road Usage Charge System	4
Table 2: County Driving Characteristics	5
Table 3: Nine Essential Functions for Operation of a Road Usage Charge System	9
Table 4: County Driving Characteristics	18

Figures

Figure 1: Hawaii County Road Usage Charge and Excise Fuel Tax Comparison	20
Figure 2: Kauai County Road Usage Charge and Excise Fuel Tax Comparison	21
Figure 3: Maui County Road Usage Charge and Excise Fuel Tax Comparison	21
Figure 4: Honolulu City & County Road Usage Charge and Excise Fuel Tax Comparison	22

Preface

Hawaii pays for the repair and upkeep of its state roads and bridges from taxes and fees on highway users. Funding sources for this repair and upkeep include vehicle registration fees, weight taxes, rental car surcharges, and motor fuel taxes. Historically, motor fuel taxes have generated the largest share of money for state roads and bridges. At 16 cents per gallon on gasoline and diesel, motor fuel taxes are the only revenue source based on how much drivers use the road network. Hawaii's counties also tax fuel in order to pay for county roads, at rates that vary from 16.5 to 23 cents per gallon. Additionally, the Federal government funds the Highway Trust Fund using a federal tax of 18.4 cents per gallon of gasoline, and 24.4 cents per gallon of diesel.

As Hawaii residents purchase new cars that consume either less fuel, or none at all, the amount of county, state, and federal funding available for roads in Hawaii from the fuel tax is declining. Moreover, the historical link between how much people drive, and how much they pay to use the roads, is fading. Although declining motor fuel consumption is a welcome trend for meeting energy and environmental goals, the Hawaii Department of Transportation (HDOT) has identified it as a risk to the sustainable and equitable funding of its roads and bridges.

In 2016, HDOT commissioned a feasibility study of transitioning from taxation of fuels to taxation of miles driven as the basis for road funding. The study concluded that a per-mile road usage charge (RUC) is feasible for Hawaii, but that several major issues must first be addressed.

RUC is a concept where roads are funded by charging vehicle owners an amount based on how much they use those roads. However, there are many details to consider before RUC can be enacted into law or implemented into practice.

In 2017, HDOT secured federal funding to perform more in-depth research into RUC. From 2018-2019, HDOT conducted this research which included a statewide telephone survey of residents, holding a series of focus groups, hosting 13 public meetings across all six islands, broadcasting an online virtual public meeting, as well as meeting with dozens of stakeholders (including county officials, neighborhood boards, civic groups, environmental organizations, chambers of commerce, etc). Building on the earlier feasibility study, this "discovery" phase of RUC research revealed several community concerns regarding the potential transition from the "taxing of fuel" model to a "fee based on miles driven" model.

HDOT and its team of Hawaii Road Usage Charge (HiRUC) researchers reviewed these concerns carefully in order to fully understand their meaning, origin, and degree of urgency. Broadly speaking, the concerns fall into three categories:

- ▶ Often, public **perceptions** are expressed as concerns. For example, some members of the public believe that a RUC system will unfairly burden rural residents. To address perception-based concerns, HDOT conducted research to determine whether there was a factual basis for these assertions and if so, what approaches exist to address these claims through policy or system design adjustments.
- ▶ The operational **challenges** that a RUC system will face are also often identified as concerns. For example, some stakeholders and members of the public worry that a RUC system would be costly to administer, as compared to the current system of fuel taxation. To address these operational and technical challenges, HDOT conducted research to better understand and improve the RUC system design.

- ▶ Sometimes, a policy **choice** is expressed as a concern. Lawmakers and system designers will have to make many choices when creating a RUC program. For example, they must choose a rate, which can be a simple flat rate per mile for all cars, or can vary based on the type of vehicle. Some members of the public would prefer a RUC system that incorporates vehicle weight, or vehicle emissions, as a factor in the rate. HDOT conducted research into the various policy choices available, as well as the relative impacts, strengths, and weaknesses of each approach.

Given the varying concerns and topics they span, HDOT decided to organize further research into these topic areas. For each topic area, a “policy paper” was initiated to summarize the nature of the concern (or concerns) within the topic area, the results of research, the analysis into the concerns, as well as the implications of the research on RUC policy or system design.

The purpose of these policy papers is not to contain recommendations or clear answers on what precisely HDOT or the Legislature should do. The purpose of each policy paper is to provide adequate background and analysis to support decision-making by lawmakers and system designers as they contemplate the enactment of a RUC system.

Executive Summary

State governments across the United States, including the state of Hawaii, have researched a road usage charge as a potential replacement for the state's excise fuel tax for funding road systems. Owing to fuel efficiency improvements in motor vehicles and the growth of low-emission and zero-emission vehicles, Hawaii and other states see an uncertain future for road funding unless change comes. Hawaii's four counties have similar concerns about the county excise fuel taxes and an interest in funding alternatives like road usage charging. Furthermore, all four county mayors have committed to converting to 100 percent clean energy by 2045.

The Hawaii Department of Transportation, in collaboration with the four counties, has engaged in the Hawaii Road Usage Charge Demonstration (HiRUC) over the past two years. Phase 1 used odometer readings taken during the Periodic Motor Vehicle Inspection program to generate a *Driving Report* that explains how a road usage charge would compare with a driver's fuel taxes. In Phase 2, HiRUC tested more automated reporting for collecting the necessary mileage data from drivers. Both phases identified potential issues that would need to be addressed before implementation, one of which would be how to integrate state and county fee collection. This report describes the policy, practical, and operational issues facing county road usage charges and provides approaches for how they could be addressed.

Since counties are facing similar reductions in transportation revenue and could be interested in transitioning to other revenue sources such as road usage charges, they could consider one of the following two options to implementing a road usage charge. One is to conjoin a county road usage charge program with a state road usage charge system, if one comes into existence. To do so, the operator of the state road usage charge system would identify vehicles subject to RUC and their owners in the state motor vehicle registry, operated by the Honolulu City & County Department of Information Technology, and apply the appropriate additional per-mile rate based on the county of registration.

The second option is to adopt a county-only road usage charge program independent of the state. A county might do this if there is no state road usage charge system or if the county prefers a different approach than the system the state has chosen. To implement a county-only road usage charge program, a county would have to ensure the system can operationalize nine essential functions, most of which already exist at the state and/or county levels. However, these functions would need to be integrated (Table 1).

Table 1: Nine Essential Functions for Operation of a Road Usage Charge System

FUNCTIONS		EXPLANATION
1	Identify subject vehicle and its owner (including address and county of residence)	Connect with vehicle registry
2	Generate distance traveled data	Report data of subject vehicle over time period
3	Access distance data	Receive reporting of distance data
4	Apply distance charge rates	Data process to determine amount of charges
5	Provide notice of the charge	Provide invoice to owner
6	Collect payment	A way or ways to pay
7	Issue acknowledgment of payment	A receipt
8	Enforce payment	Mechanisms to ensure everyone pays
9	Remit net revenues to road fund	Integrate revenue collection with financial systems

Several critical policy and practical issues should be considered before implementing a county-only road usage charge program. These include the following:

- ▶ Decide which vehicles would be included in a RUC.
- ▶ Identify and charge payers who change county residencies.
- ▶ Decide whether to charge for driving off public roads; identify non-public road driving activity.
- ▶ Take steps to protect the privacy of drivers’ data.
- ▶ Create an enforcement system.
- ▶ Determine the road usage charge rate.
- ▶ Create procedures to pay and manage road usage charge administration.

Perhaps the most important consideration to adopting a county road usage charge system is the financial consideration of the transition away from the excise fuel tax. The 2021 U.S. Energy Information Administration *Annual Energy Outlook* shows overall U.S. motor fuel consumption in steady decline, especially in the next decade, even as overall driving continues to increase.¹ The prospect for maintaining fuel tax revenue levels under the status quo for Hawaii’s counties will be challenging.

The potential revenue impact and risk of reliance on the fuel tax differs for each of Hawaii’s four counties. Table 2 shows that Hawaii and Maui Counties have higher fuel tax rates than Kauai County and Honolulu City & County. Combined with the higher average annual miles per vehicle, this results in Hawaii and Maui Counties, respectively, having about double the county fuel tax paid per vehicle than Kauai and Honolulu.

¹ U.S. Energy Information Administration. 2021. *Annual Energy Outlook*. <https://www.eia.gov/outlooks/aeo/>.

Table 2: County Driving Characteristics

COUNTY	COUNTY FUEL TAX RATE (PER GALLON)	NUMBER OF VEHICLES	AVERAGE ANNUAL MILES PER VEHICLE	AVERAGE VEHICLE MPG	AVERAGE ANNUAL FUEL TAX PAID	AVERAGE ANNUAL FUEL TAX PAID (CENTS PER MILE)
Hawaii	\$0.23	146,719	17,657	18.8	\$215	1.22
Kauai	\$0.17	56,681	11,999	19.7	\$103	0.86
Maui	\$0.23	121,588	19,151	21.6	\$204	1.06
Honolulu	\$0.165	583,286	11,098	22.0	\$83	0.75

As fuel efficiency continues to improve, Hawaii and Maui Counties may lose a significant amount of fuel tax revenue—as a percentage of total revenue—because they rely on the fuel tax more than other funding sources, relative to other counties. Having the most vehicles, Honolulu City & County risks losing the largest overall *amount* of fuel tax revenue.

A county must consider the cost of tax collection to determine net revenues. Unfortunately, the Department of Taxation does not segregate costs of fuel tax collection from other state taxes, the cost is likely similar to other states that estimate collection cost at less than one percent of gross revenue. A county will find it challenging to come near that level of collection cost for a road usage charge unless the county either piggybacks onto a state road usage charge system or directly accesses the Periodic Motor Vehicle Inspection program to collect mileage-driven data.

Should the state implement a road usage charge program, the counties may find a simple approach is to combine with it. If not, then the option of county-only road usage charge requires a fair amount of additional policy and program design choices.

Definitions & Abbreviations

TERM/ABBREVIATION	DEFINITION/DESCRIPTION	REMARKS
DIT	Honolulu Department of Information Technology	
DMV	department of motor vehicles	
EPA	U.S. Environmental Protection Agency's	
HDOT	Hawaii Department of Transportation	
HiRUC	Hawaii Road Usage Charge	
OBD II	on-board diagnostic	
PID	Plug-in Device	
PMVI	periodic motor vehicle inspections	
RUC	road usage charge	

1. Introduction

1.1. Purpose and Context

Hawaii's counties have partnered with Hawaii Department of Transportation (HDOT) to research a road usage charge (RUC) for funding Hawaii's road system. This paper describes how a county can collect a RUC for county-only uses and lays out the policy, practical, and operational issues necessary to resolve and enable a county RUC system.

1.1.1. Objectives

The objectives of this paper are as follows:

- ▶ Describe the **options for implementing a RUC program and system** for Hawaii's counties.
- ▶ Describe the **functions necessary to implement** an operational RUC system.
- ▶ Explain the **policy decisions** for a county to implement a RUC program and system.
- ▶ Explain the **system decisions** for a county to implement a RUC program and system.
- ▶ Explain the **process and data requirements** to implement an independent county RUC program and system.

2. Background

2.1. Motivations for Considering a Road Usage Charge

For the past two decades, state governments across the United States have sought an alternative to the excise fuel tax as the primary road funding mechanism. Because of the shift to highly fuel-efficient and plug-in electric vehicles, fuel tax revenues are declining. The future for road funding through motor fuel taxes will be a challenge unless alternatives are found.

Hawaii is experiencing the same trend as other states. State law dedicates nearly all excise fuel tax revenue to the state highway fund, whereas county fuel taxes are dedicated to the respective county road funds. As the second-leading state in the adoption of electric vehicles, Hawaii's revenues from the excise fuel tax are declining quickly at both the state and county levels. An alternative to the fuel tax is needed.

Since fuel taxes are based on vehicle fuel consumption, which is decreasing, state governments, including Hawaii, have commenced investigations into a new revenue source.² A RUC, which is a roadway consumption tax that uses distance, stated in miles, as the measure of consumption, is this new road revenue source. The proposition is whether a RUC should replace the excise fuel tax as the primary road funding mechanism.

2.1.1. Essential Functions to Operate a Road Usage Charge System

A RUC program must have the ability to operationalize nine essential functions to collect the charge from owner/operators of subject vehicles (see Table 3 for a list and explanation of the nine essential functions for operation of a RUC system). Many of these functions are common to all government tax and fee systems.

Utah and Oregon are using each of the nine functions for their operational RUC programs. The HDOT has investigated and demonstrated most of these functions in its Hawaii Road Usage Charge (HiRUC) Demonstration.

² The other states actively engaged in research and operations for the road usage charge include Oregon, Utah, Washington, California, Colorado, Pennsylvania, Delaware, New Jersey, Virginia, North Carolina, Wyoming, Minnesota, and Kansas.

Table 3: Nine Essential Functions for Operation of a Road Usage Charge System

FUNCTIONS		EXPLANATION
1	Identify subject vehicle and its owner (including address and county of residence)	Connect with vehicle registry
2	Generate distance traveled data	Report data of subject vehicle over time period
3	Access distance data	Receive reporting of distance data
4	Apply distance charge rates	Data process to determine amount of charges
5	Provide notice of the charge	Provide invoice to owner
6	Collect payment	A way or ways to pay
7	Issue acknowledgment of payment	A receipt
8	Enforce payment	Mechanisms to ensure everyone pays
9	Remit net revenues to road fund	Integrate revenue collection with financial systems

2.1.2. Hawaii Road Usage Charge Demonstration

Researchers in the United States have explored ways to determine the distance a vehicle travels, essentially relying on data generated by the vehicle’s computer systems. Various reporting methods range from drivers’ fully manual reporting of odometer readings to fully automatic reporting from devices installed within vehicles.

Hawaii Road Usage Charge Demonstration Phase 1: Driving Report Demonstration

Following exploratory research, HDOT launched Phase 1 of the HiRUC Demonstration in October 2019, consisting of fully manual odometer reporting for road usage charging. Using odometer readings compiled during the periodic motor vehicle inspections (PMVI) and vehicle data from the existing motor vehicle registry, the HiRUC Demonstration began issuing Driving Reports to compare each vehicle’s fuel taxes paid with an illustrative RUC.

To report mileage data, vehicle owners take their vehicles to a certified PMVI station, where an inspector records the vehicle’s odometer reading as part of the vehicle’s inspection process. The PMVI inspection station transmits vehicle inspection data, including VIN, odometer reading, the date of the inspection, and whether the vehicle passed or failed inspection, to PMVI’s servers. These inspection data are property of the state.

To estimate fuel taxes paid, HiRUC applied the state and county fuel tax rates to an estimate of a vehicle’s fuel consumption. HiRUC estimated fuel consumption by dividing the vehicle’s reported miles traveled by the vehicle’s U.S. Environmental Protection Agency (EPA) combined city/highway fuel economy rating. Phase 1 does not require drivers or vehicle owners to install devices in their cars, directly report mileage, or to provide any data other than what they are already required to do as part of their vehicle registration/renewal and PMVI. Registered vehicle owners received a Driving Report in the mail, comparing an illustrative RUC, calculated from reported odometer readings, with current estimated cost of the state and county motor fuel excise tax paid during the same driving period.

Phase 1 of the demonstration interacted with both PMVI and Honolulu Department of Information Technology (DIT) legacy systems. The HiRUC system periodically received vehicle data from DIT and PMVI. The data were used to determine distance driven and calculate estimated fuel consumption by that vehicle, as well as eligibility of a given vehicle to receive a Driving Report.



Phase 1 did not directly integrate with either the PMVI or DIT systems. Data transfers took the form of *offloads* from the state motor vehicle registry and *uploads* into the HiRUC Demonstration system via a data loader routine. Other than providing periodic data updates, PMVI and DIT did not change any of their operations to accommodate the demonstration, and drivers did not experience any changes to their interactions with these entities.

Periodically, both the vehicle registry and PMVI servers sent data to the HiRUC System Administration, which combined the data to create Driving Reports. Driving Reports were mailed to the address recorded in the vehicle's registration record.

Hawaii Road Usage Charge Demonstration Phase 2: Technology Test Drive Demonstration

In Spring 2020, Phase 2 of HiRUC began testing automated reporting methods to measure distance driven and fuel consumed and to calculate fuel tax paid. Unlike Phase 1's fully manual odometer reporting, Phase 2's automated reporting methods do not rely on PMVI. Rather, the HiRUC Phase 2 demonstration uses a private-sector service provider and software tools developed specifically for the demonstration. Based on these data, illustrative Road Usage Reports were prepared for enrolled vehicles and emailed to the vehicle owners.

HiRUC Phase 2's automated reporting requires vehicle owner/operators to create a "RUC account" with a service provider and either (1) install a plug-in reporting device into their cars for wireless reporting Plug-in Device (PID), either with or without GPS location detecting capabilities, or (2) periodically upload photos of odometer mileage using a smartphone app or camera-equipped mobile phones. The idea is that drivers preferring fully automated reporting—the PID with GPS—may want to identify mileage driven on private property or off public roads so that those miles are not charged. Others—those opting for the photo uploads or the PID without GPS—may desire more frequent reporting than once a year, as is the case with PMVI.

The on-board diagnostic (OBD-II) PID with location awareness uses a small device that plugs into a vehicle's data port. Access to the data port is essential to fully automated reporting because the OBD-II system accurately records a vehicle's distance traveled and fuel consumption. The device contains a cellular modem for sending data to the private-sector service provider and a GPS chipset, which is used to determine the vehicle's location. Hawaii is also testing a similar device without location awareness that cannot determine a vehicle's location but can still accurately record miles driven and fuel consumed.

In addition to the fully automated PID reporting method, drivers had the option of submitting odometer photo images on a periodic basis using a mobile phone camera, a method known as OdoFoto. The images were submitted using either the private-sector service provider's smartphone app or a web service. This option may be attractive to drivers who do not wish to install any equipment into their vehicles, and it may be the only option, other than the PMVI, available to drivers of cars manufactured prior to 1996 and some models of plug-in electric cars. This option does not provide the opportunity to exclude off-road driving, but it does allow more frequent reporting than with PMVI.

3. Considerations for Collection of a County Road Usage Charge

3.1. Policy and Practical Considerations for a County Road Usage Charge Program

Before a county establishes a county RUC system, it must determine whether it has the authority to enact RUC, either as a standalone program or in conjunction with a state program. Once authority is determined, there are a number of policy and practical questions to answer, as well as consideration of the financial impact on county road revenues. The answers to these policy questions must all be determined, regardless of whether a county authorizes collection of a local RUC by the state in conjunction with the state's RUC program, or it creates its own separate county RUC program.

3.1.1. Vehicles Subject to County Road Usage Charges

The county enacting RUC must determine the vehicle types subject to RUC. Utah and Oregon applied RUC to only light vehicles. Oregon also has a program similar to RUC for heavy vehicles, as do Kentucky, New York, and New Mexico. Differences in the types of vehicles and their commercial value indicates that light vehicles and heavy vehicles should be treated separately for distance-based charging. No state or nation treats them the same for purposes of road usage charging. Furthermore, the HiRUC Demonstration only tested RUC for light vehicles.

Theoretically, a county could apply RUC to all light vehicles without regard to type. A county may become interested in RUC because of the drop in expected road revenues because of the growth of fuel-efficient vehicles, which pay less fuel tax. This may indicate that the county should only apply RUC to the more fuel-efficient vehicles, while keeping less fuel-efficient vehicles on the fuel tax. For example, a county could enact a RUC on electric and hybrid vehicles, perhaps as an option in lieu of flat fees (e.g., in lieu of flat annual surcharges in Maui County assessed on electric and hybrid vehicles), which is similar to the approach taken in Oregon and Utah.

3.1.2. Setting Jurisdictional Boundaries

A county may desire to preclude charging its residents for miles driven outside county boundaries. Although seemingly trivial for Hawaii's island counties, many vehicles are kept in counties other than their county of registration. It may also be important for fleets that ship vehicles among the counties frequently, with county of registration differing from county of operation (and inspection). Counties may assume all miles calculated from the PMVI process are driven within the county where the *inspections* took place, thus charging the miles only to that county, rather than the county of registration. Alternatively, in a fully automated system, a county can easily set up digital map boundaries. The county could then offer its residents location-aware, wireless mileage reporting options like those used in the HiRUC Demonstration to identify miles driven within each respective county.

3.1.3. Identifying Payers

To identify the drivers who would report miles and pay county RUC, the county would use the state motor vehicle registry. By sorting the registry for vehicles registered in the county, the county could identify residents obligated to pay county RUC, similar to how other county vehicle fees are assessed today. While uncommon, officials must consider how to charge county RUC to vehicle owners who move their vehicles to other counties but maintain the vehicle registration in the county they moved from. The county has two options for this scenario.

- ▶ Option one: The county of vehicle registration charges the county RUC rate on all miles driven whether in county or not. For vehicle owners using location-aware reporting, the county RUC system could identify the total chargeable miles for the vehicle. If, on the other hand, a vehicle owner uses fully manual odometer reporting rather than location-aware reporting, the county would access the odometer reporting during the PMVI to determine the number of miles driven. Enforcement may prove difficult notwithstanding the reporting method unless the county entered into an intergovernmental agreement with the county of the former resident or the state RUC system (if one exists).
- ▶ Option two: For vehicles using fully manual odometer reporting, the county could assess RUC based on the location of the PMVI inspection. If both recent inspections took place in the same county, that county would assess the RUC. If the two recent inspections took place in distinct counties, the counties could apply a RUC rate and share revenue by rule, unless the vehicle's owner is required to update its registration and report its odometer reading upon moving to a new county.

In selecting an option, the counties may want to cooperate to ensure the combination of individual county selections do not result in drivers avoiding payment of county RUC by registering a vehicle in one county while residing in another.

Applying county RUC to tourists should be more straightforward. Rental cars, taxis, and TNC (transportation network company) vehicles registered with the county have owners who would be subject to RUC. Whether these owners pass the RUC cost on to their customers is a business decision they can make.

3.1.4. Public vs. Nonpublic Roads

Since RUC pays for only the public road system, vehicle owners may find it advantageous for the RUC system not to count and charge for miles driven on private roads or off road. Most drivers could meet their mileage reporting obligation with some variation of odometer reporting or non-location-aware, technology-based reporting.

For those who drive significant distances off-road or on private roads, fully automated, location-based mileage reporting could be made available. Some counties, however, tend not to have comprehensive maps of which roadways are public and which are private. New research will investigate this challenge more thoroughly and offer solutions. Alternatively, a county could offer a standard mileage exemption for drivers whose vehicles are registered on a farm, ranch, or in a homeowner's association with privately maintained roads.

3.1.5. Protecting Privacy

Many Hawaii residents are sensitive to third-party usage of their personal information and have a strong interest in protecting privacy and data security. Other states have developed technical mechanisms, protocols, and legal protections for privacy and data security. Counties should consider applying these measures to any RUC program that may be adopted.

3.1.6. Enforcement

Without knowing the exact RUC system a county will deploy, appropriate enforcement methods need to be identified in tandem with the selection of a RUC system. A county's system designers should consider enforcement mechanisms while designing the RUC system for the county, most likely relying on the same procedures already in place for existing vehicle-related taxes and fees.

3.1.7. Setting the Road Usage Charge Rate

Setting the RUC rate is perhaps the most critical issue for county RUC. The RUC rate determines, along with cost of administration, the amount of revenue the RUC program will generate for the county road system.

The county council will likely be the final arbiter to set the rate for a county RUC program. In setting the rate, officials should examine the amount of money the county needs to maintain the county road system, the cost of administering RUC, and how the rate relates to the fuel tax rate during a transition from one system to the other.

Counties will consider other questions as well. Will the initial RUC rate be comparable to the county fuel tax? In a transition period, should the RUC rate be linked to the fuel tax rate such that vehicles paying RUC pay an equivalent amount to what the average car pays in fuel taxes? Should there be multiple rates for different categories, such as gasoline-powered vehicles, electric vehicles, commercial vehicles, different vehicle weights, different types of uses, or different types of owners? The county will also need to consider if the RUC rate would be based on taxable miles as opposed to total miles driven. This ties into the previous discussion of public and nonpublic roads. Whether a county could charge different rates for different types of travel or for certain types of drivers—such as rental cars—is a policy and legal issue for the county to determine. The county may find that imposing a higher RUC rate to rental cars and/or taxis is favorable, just as a daily surcharge is applied to rental vehicles (and monthly surcharge on tour vehicles) in the state to support highway funding.

3.1.8. Cost of Administration

Understanding the costs of administration of the various approaches to collecting a RUC is an important consideration. Costs are very likely to be higher than the administration cost associated with collecting fuel taxes, which is considered by most transportation economists to be among the lowest collection costs of all taxes and fees.

Several variables influence the cost of collecting RUC, such as how vehicle owners report mileage (for example, through PMVI versus in-vehicle technology, smartphone apps, or other methods), how often it is collected (for example, annually, quarterly, or monthly), and how many vehicles are subject to the charge. Another important variable is whether the RUC system can rely on existing systems, such as the PMVI and DIT, or a private-sector service provider. The county must consider the cost of county government operational functions related to RUC, such as communications, collection, accounting, auditing, information systems, and enforcement.

3.1.9. Transition to a Full-Application County Road Usage Charge System

To complete the transition to all vehicles in a county paying RUC, the main issue is the possible loss of revenue. There are three options to accomplish this full transition to RUC for all vehicles in a county: (1) a massive shift on set dates, (2) temporary retention of fuel taxes as a transitional measure, and (3) replacing other vehicle fees and charges with RUC.

Massive Shift on Set Dates

This option abolishes fuel taxes on vehicles subject to RUC, implementing RUC on set dates based on motive power (e.g., gasoline, diesel). Abolishing the fuel tax in steps based on motive power would be an ordered approach. This approach avoids the drawbacks of a credit, refund, or exemption system required for maintaining fuel taxes in a transition period. Eliminating the fuel tax altogether also provides some assurance to drivers they will not be double taxed, as long as fuel retailers pass along tax savings to consumers.

A county could implement RUC first on vehicles that pay no fuel tax now (for example, purely electric vehicles, an approach that Utah recently elected to do. The county would shift to RUC and abandon the fuel tax in one step for all those using one type of fuel (for example, gasoline or diesel), followed by another type of fuel, and so on, until a full transition is achieved. There is risk in such an approach because it means that hundreds of thousands of vehicles would need to switch to RUC on a set date.

Other states investigating RUC have yet to embrace the “massive shift on set dates” approach. Rather, other states, particularly Utah and Oregon, have focused on a slower transition whereby the fuel tax is maintained for a long duration as a back-up system. In this way, the state ensures there is sufficient time to address any implementation issues and reduce the risk of lost revenues

Temporary Retention of Fuel Taxes as Transitional Measure

This option retains fuel taxes as a transitional measure, with a system to credit RUC payers for payments of fuel taxes, and implementation of RUC in steps not linked to engine motive power. Retaining the fuel tax for a transitional period requires a robust credit or refund system implemented in parallel. This should enable credits of fuel taxes on RUC accounts, similar to the Oregon RUC system, and tested in the HiRUC Demonstration. Implementation of an actual system, however, should consider the lessons learned in balancing cost, fraud risk, accuracy, and fairness in terms of social equity. Specifically, the cost of maintaining a credit or refund system can be non-trivial, especially if it requires technology to measure fuel use. Manual systems, as tested in phase 1 of HiRUC, are less costly to administer, but also less accurate, as many vehicles vary from the EPA rated MPG. These variations risk undermine confidence in the system as a whole as a fair way to assess road usage costs.

Replacement of Certain Vehicle Fees and Charges other than the Fuel Tax.

The Oregon legislature will consider legislation next year for a slow-moving RUC mandate for all passenger vehicles with model years beginning in 2027 and a combined fuel efficiency rating of at least 30 miles per gallon. Rather than offset the fuel tax, the Oregon legislation would replace a supplemental registration fee on fuel-efficient vehicles and miles-per-gallon title fees with a RUC mandate. This option retains the fuel tax, avoiding the drawbacks of a credit, refund, or exemption system, making transition simpler. Politically, this policy would not draw the ire of environmental groups the way that replacing fuel tax with RUC does.

3.2. Integrating County Road Usage Charge into a State Road Usage Charge

If the state adopts a RUC system to replace the state excise fuel tax, the county may have the opportunity to collect the county portion of RUC in conjunction with the state portion. This would require authority for a county add-on program within the state RUC statute, much like the fuel tax today. It would also require reaching an agreement with the state about how each county RUC would work, including translation of any county-specific policy features (including all of those previously discussed) to the operations of the state-run RUC system. The state and participating counties would need to negotiate a cost-sharing arrangement, given both would likely incur costs (i.e., the state runs the PMVI system, and the counties run individual departments of motor vehicles, all relying on Honolulu City & County DIT for operating the single statewide registry).

A county RUC program may seek to piggyback onto a state RUC program by integrating with a state RUC system as it is defined. At this point, since the state legislature has not authorized a state RUC system, how to integrate with the state system is largely unknown. That said, there is much that a county can discern from the HiRUC Demonstration project research, the way other taxes and fees are collected, and the operational RUC programs in Utah and Oregon.



To identify vehicles and vehicle owners (and lessees) subject to state taxes, fees, and a potential RUC, the state accesses the motor vehicle registry. Any county conjoining a county RUC with the state RUC system will do the same for the vehicles subject to a county RUC, just as counties do presently for county-specific fees like weight taxes and vehicle registration fees.

As for obtaining mileage traveled data, the HiRUC Demonstration described in Section 2 shows that the state RUC system may look similar to those investigated in the HiRUC Demonstration. The ultimate state RUC system may only use the fully manual odometer reporting method through the state's existing PMVI program, or technology-based mileage reporting, whether fully automated or photo imaging, or both odometer and technology-based reporting to allow drivers a number of options. How mileage reporting occurs for a state RUC program will be determined by legislative directive or implementation decisions made by HDOT. The mileage data can be used for state and county purposes, as HiRUC has demonstrated.

Neither HiRUC phase tested a billing and collection system given the illustrative nature of the HiRUC Demonstration. For counties to determine how billing and collection may work in a state RUC system, counties should look to a combination of how they collect other fees and taxes, such as weight taxes and vehicle registration fees, and how the states of Utah and Oregon collect RUC in their operational systems (currently the only two operational RUC systems).

3.3. County-Only Road Usage Charge

If the state has not adopted a RUC system for state road funding or the county prefers an approach to collecting county RUC different from how the state collects RUC, the county may adopt an independent county RUC system. Before deciding to pursue such a county-only RUC program, the county must understand its policy ambitions for RUC as well as its capabilities to evaluate the various options for, and undertake the expense of, constructing and operating a RUC system independent of any other. The next chapter explores the operational requirements of a RUC system from the point of view of a county.

4. Process and Data Required to Collect Independent, County-Only Road Usage Charges

A RUC system must operationalize the following nine essential functions required to collect a county-only RUC independent of the state RUC system. Should the state decide to implement a RUC system, the county may still need to implement some of these functions on its own, in addition to the state's function, as indicated throughout the nine sections that follow.

4.1. Vehicle and Responsible Party Identification

This function already exists. A county-only RUC system must have the capability to identify the vehicles subject to RUC and their owners. A county may identify the subject vehicles by accessing the vehicle database managed for each county by DIT. Each subject vehicle must be associated with a responsible party, meaning an owner or lessee.

4.2. Generate Base Data for Subject Vehicle Over Designated Period

This is a new function. The county-only RUC system must have the capability to generate the base data for each subject vehicle during a specific period. The base data relevant to the county RUC system for each subject vehicle are reported distance traveled, and, if there is a credit for fuel tax paid, the vehicle's MPG rating (in order to calculate estimated fuel consumption). Odometer readings can occur any number of ways, but the simplest may be the existing annual odometer reporting occurring for HDOT's PMVI program.

For fully automated reporting, a participating vehicle owner or operator installs a plug-in reporting device that connects to the vehicle's OBD-II port. Access to the OBD-II port is essential to fully automated reporting, because the OBD-II system accurately records a vehicle's distance traveled and fuel consumption. The reporting device accesses this data from a vehicle's OBD-II system and wirelessly reports it to a third-party account manager for purposes of generating a billing statement.

4.3. Access Vehicle Base Data

This is a new function. The county-only RUC system must access the base data for each vehicle. The RUC system can obtain the reported distance traveled data either (1) through direct odometer readings by county personnel or from the annual odometer reporting occurring for HDOT's PMVI program; or (2) by receipt of fully automated reporting from the vehicle itself, which can occur either through direct reporting to the county or through a third-party account manager under contract with the county.

The RUC system can obtain each vehicle's estimated fuel consumption data by using either the vehicle's EPA fuel economy rating; or, for vehicle owners opting for fully automated reporting, the RUC system can obtain an estimate of fuel consumption from a vehicle's on-board diagnostic system in the same manner as for mileage reporting.

To access these data, whether generated by PMVI or county department of motor vehicles (DMV) personnel or a third-party service provider, the county can either create its own database or it can work with DIT to extend the capabilities of the existing vehicle registry to capture the additional information.

4.4. Apply Tax Rates

This is a new function, but it has a precedent in parallel in that counties already apply distinct tax rates for weight taxes and vehicle registration fees, including fees that vary by vehicle type (e.g., Maui's EV and hybrid surcharges). The county-only RUC system applies the county-approved RUC rate to the reported distance traveled data by processing the data received for the specific period, to calculate the RUC amount owed by each vehicle owner (or lessee). For vehicles warranted a credit for fuel tax paid, the RUC system will reduce the amount owed by that amount. Although it is conceivable a county could build its own charging system, to save cost and make the system more customer-friendly, a county may prefer to work with DIT to create this functionality and integrate it with existing vehicle registration taxes and fees so that customers only require one touch point.

4.5. Notice of Charge to Vehicle Owner (Lessee)

This is a new function, but it could be integrated into the existing registration process. The county-only RUC system notifies each vehicle owner (or lessee) of a subject vehicle of the net RUC owed.

4.6. Collect Payment

This is a new function, but it could be integrated into the existing registration and annual renewal process. The county-only RUC system collects the net RUC owed from the payer in the same manner and ways as for any other tax or fee owed the county. Should the county desire to offer periodic payments for vehicle fees as opposed to annual lump-sum payments, such a system would need to be built. RUC could be among the fees paid in periodic payments, but RUC alone does not warrant a periodic payment system. Given the likelihood that other combined vehicle taxes and fees would be larger than RUC.

4.7. Issue Acknowledgment of Payment

This is a new function, but it could be integrated into the existing registration process. The county-only RUC system acknowledges payment by providing a receipt or other verification of payment.

4.8. Enforce Payment

This is a new function, but it could be integrated into the existing registration process. The county-only RUC system enforces the net RUC owed from the payer in the same manner as for any other tax or fee owed the county. Applicable policies, county codes, or ordinances may need to be modified to support this new system.

4.9. Remit Net Revenues

This is a new function, but it could be integrated into the existing process for distributing funds collected from DMVs to appropriate county accounts. Once the DMV receives payment of RUC, the agency remits the net RUC revenues to the appropriate road fund for the county.

5. Financial Considerations for Replacing County Fuel Tax with County Road Usage Charge

The primary purpose of replacing fuel taxes or other fees and taxes with RUC is to provide a revenue mechanism in which all road users pay their fair share, and for a sustainable revenue stream for a county’s road system. All motor vehicles pay the fuel tax in Hawaii except pure electric vehicles. Although electric vehicles currently comprise a small, albeit growing, share of vehicles in the state, vehicles powered by gasoline and diesel will remain as the primary contributor of road revenues over the coming decades, though they will become much more fuel efficient.³

5.1. The Nature of Driving in Hawaii’s Counties

The counties have different fuel tax rates, different compositions of vehicles, and different driving experiences (Table 4).

Table 4: County Driving Characteristics⁴

COUNTY	COUNTY FUEL TAX RATE (PER GALLON)	NUMBER OF VEHICLES	AVERAGE ANNUAL MILES PER VEHICLE	AVERAGE VEHICLE MPG	AVERAGE ANNUAL FUEL TAX PAID	AVERAGE ANNUAL FUEL TAX PAID (CENTS PER MILE)
Hawaii	\$0.23	146,719	17,657	18.8	\$215	1.22
Kauai	\$0.17	56,681	11,999	19.7	\$103	0.86
Maui	\$0.23	121,588	19,151	21.6	\$204	1.06
Honolulu	\$0.165	583,286	11,098	22.0	\$83	0.75

These data reveal that the average Hawaii County and Maui County driver drives many more miles per year—more than 30 percent more—than does the average Kauai and Honolulu driver. Hawaii County resident drivers drive the longest distances for daily activities such as commuting, shopping, and working. Maui County receives the most tourists relative to the local population (160 visitor-days per resident, compared to 151 for Kauai, 70 for Hawaii, and 44 for Oahu), and visitors to Maui are more likely to rent vehicles than visitors to other islands (Maui visitors spend 10 to 30 percent more on rental cars relative to total spending than visitors to other islands).⁵ This prevalence of rental vehicles, which tend to be driven much more per year than private vehicles, may explain why Maui has the highest number of miles driven per vehicle than any other county. Given that rental cars tend to be newer, this likely also explains, at least in part, why the average MPG is significantly higher in Maui than in Kauai and Hawaii Counties.

Kauai County and Hawaii County drivers drive less fuel-efficient vehicles—generally older and working vehicles for farms and ranches. For both counties, the average vehicle gets less than 20 MPG. Combining low vehicle fuel efficiency with a higher fuel tax rate means that the average driver in Hawaii

³ United States Energy Information Administration, *Annual Energy Outlook 2020*, pp. 93-108.

⁴ Figures based on consultant analysis of PMVI and DIT data.

⁵ Figures based on consultant analysis of 2019 Annual Visitor Research Report, by Hawaii Tourism Authority, <https://files.hawaii.gov/dbedt/visitor/visitor-research/2019-annual-visitor.pdf>.

County effectively pays more in fuel taxes per mile than drivers in the other three counties, with a rate of 1.22 cents per mile. Honolulu City & County has the lowest fuel tax rate and, therefore, the lowest fuel tax paid per mile at a quarter of a penny (0.75 cents).

5.2. Impact of Continuing Reliance upon the Fuel Tax

The potential revenue impact and risk of reliance on the fuel tax differs for each of Hawaii's four counties. Table 4 shows that Hawaii and Maui Counties have higher fuel tax rates and higher average annual miles per vehicle than do Kauai County and Honolulu City & County. This results in Hawaii and Maui Counties, respectively, having about double the county fuel tax paid per vehicle than do Kauai and Honolulu. The largest total fuel tax revenue, however, goes to Honolulu, which is the location of 64 percent of all the vehicles in the state.

As vehicles become more fuel efficient, Hawaii and Maui Counties have greater risk of losing a significant amount of fuel tax revenue—as a percentage of total revenue—because they rely relatively more on the fuel tax than do the Kauai County and Honolulu City & County. In essence, Hawaii and Maui counties have a high risk of losing a large percentage of their fuel tax revenue as vehicles become more fuel efficient and shift to electric-powered traction. Home of the largest number of vehicles, Honolulu City & County has the greatest risk of losing the largest overall amount of fuel tax revenue as vehicles become more fuel efficient.

5.3. Comparison of Future Fuel Tax Revenues with Road Usage Charge Revenues

The 2021 *Annual Energy Outlook* shows the overall U.S. motor vehicle consumption in steady decline, especially in the next decade, even as overall driving continues to increase. The prospects for maintaining fuel tax revenue levels under the status quo for Hawaii's counties is uncertain.

The four counties have three principal options for maintaining current road revenue levels. The first is to steadily increase the fuel tax rate as fuel efficiency increases. Drivers with older, less fuel-efficient vehicles will bear a heavier burden than those driving newer-model, more fuel-efficient vehicles, including most rental cars. While electric vehicle owners pay a flat annual state registration surcharge of \$50, they are not subject to fuel taxes.

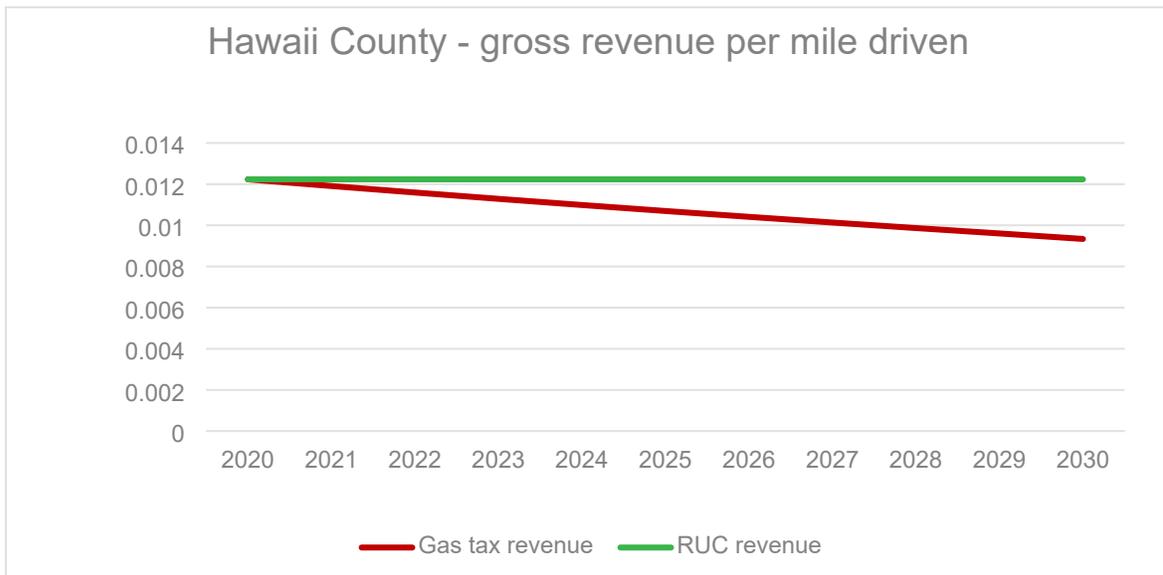
The second option is to increase other fees and taxes related to vehicle ownership and use, such as weight taxes, registration fees, and alternative fuel vehicle surcharges. Raising these fees or taxes increases the cost of owning a vehicle, placing a larger burden on less affluent drivers who may respond by taking fewer discretionary trips because they cannot afford the additional cost. Furthermore, this option moves away from the user pays principle in that the added fees and taxes do not relate directly to actual use of the road system.

Counties could make the policy decision to replace the fuel tax with a per-mile RUC as a third option, whereby every vehicle pays the same amount per mile of driving. This is in alignment with the user pays principle. COVID-19 impacts notwithstanding, RUC would also help maintain the current level of road funding for each county without additional tax rate increases as vehicle fuel efficiency increases.

One should compare RUC with the excise fuel tax by examining the cost of each one measured in *cents-per-mile-driven*. The concept of cents-per-mile-driven shows the available revenue relative to the burden on road infrastructure. As the cents-per-mile-driven decreases over time, it means a county has less revenue to maintain its more burdened road system. Under the status quo of the fuel tax, cents-per-mile-driven will naturally decrease as average vehicle fuel efficiency increases. Under RUC, the cents-per-mile-driven is not affected by changes in fuel efficiency.

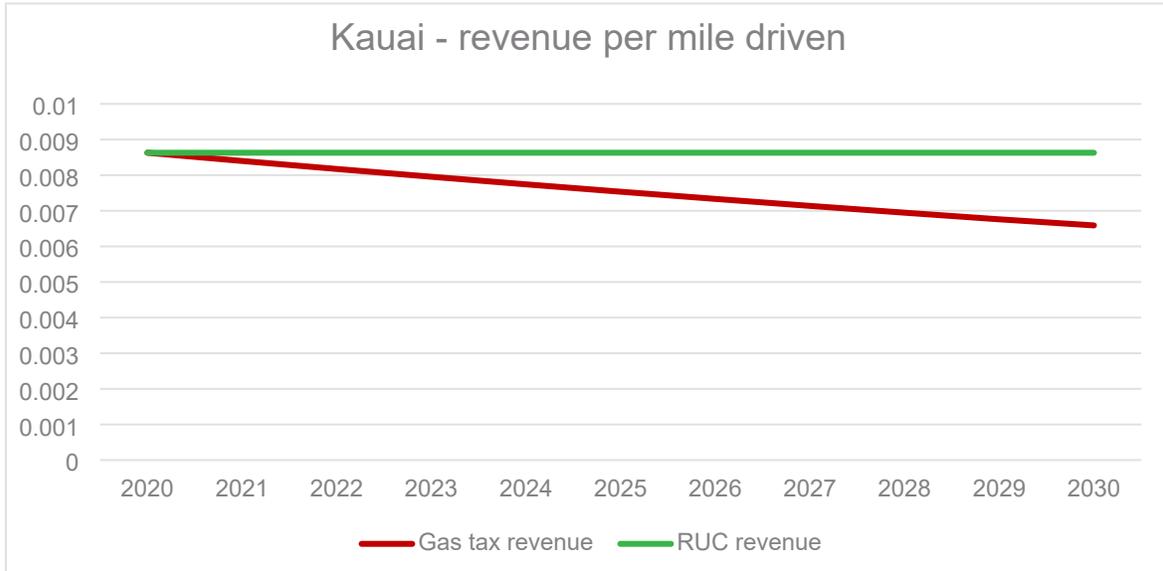
Based on the 2020 Annual Energy Outlook projections of vehicle fuel economy improvements, under the status quo, all counties in Hawaii will experience a drop of approximately 24 percent in per-mile fuel tax revenue over the next 10 years. Based on this projection, Hawaii County’s fuel tax per-mile-driven will drop from 1.22 cents-per-mile to 0.93 cent-per-mile over the course of the next 10 years. This is calculated by dividing today’s 23 cent-per-gallon fuel tax by the average MPG of 18.9 today (resulting in 1.22 cents per mile), compared with 23 cents per gallon divided by 24.7 MPG in 10 years (resulting in 0.93 cents per mile). A RUC that is revenue-neutral, meaning the RUC does not increase revenue above what is currently collected from the fuel tax, will stay at 1.22 cents-per-mile throughout the coming decade (Figure 1).

Figure 1: Hawaii County Road Usage Charge and Excise Fuel Tax Comparison



Kauai County fuel tax cents-per-mile-driven, on the other hand, will drop from 0.86 cent-per-mile-driven to 0.66 cent-per-mile-driven by the end of the decade. A revenue-neutral RUC will stay at 0.86 cent-per-mile throughout the coming decade (Figure 2).

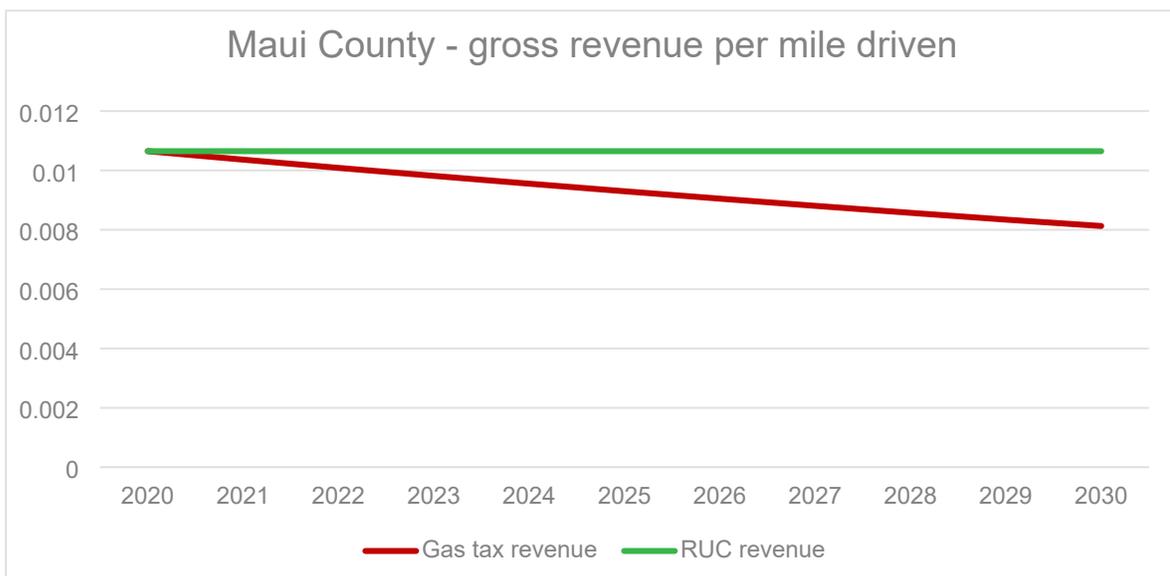
Figure 2: Kauai County Road Usage Charge and Excise Fuel Tax Comparison



The cents-per-mile-driven under the status quo (fuel tax) for Maui County drops from 1.06 cents-per-mile-driven in 2020 to 0.81 cent-per-mile-driven by 2030. A RUC rate, set at a revenue-neutral level of 1.06 cents-per-mile-driven, will not change over the course of the coming decade.

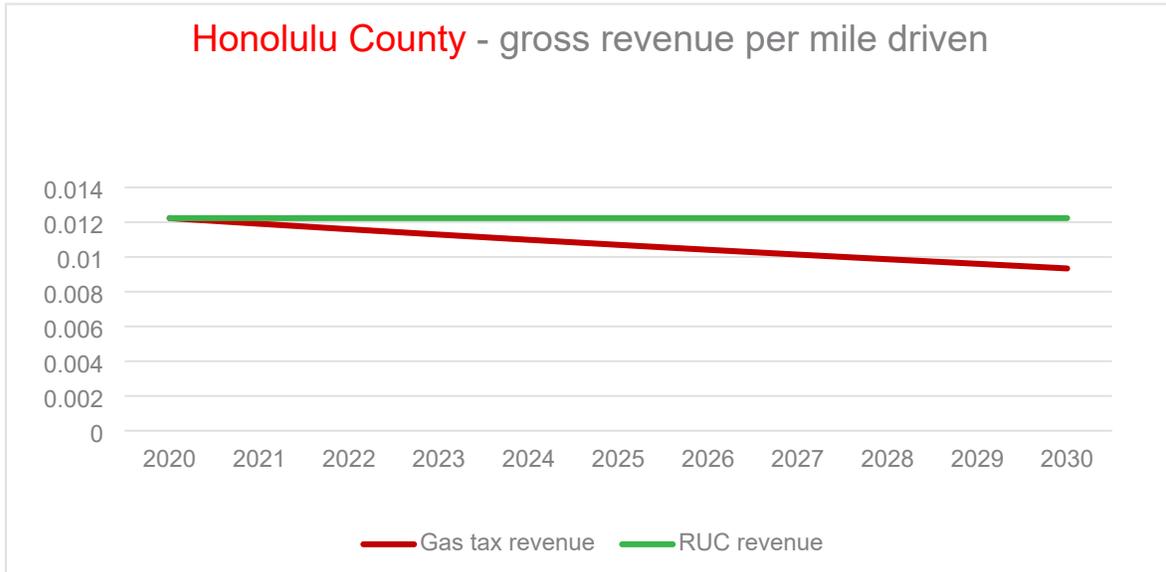
Figure 3 and Figure 4 show that each of the four counties would benefit by replacing the excise fuel tax with a RUC collected efficiently. An efficiently collected RUC means that the administrative costs to collect RUC are not large relative to the gross revenue raised. With revenue maintenance as the objective, maintaining the current level of net revenue (gross collections minus administrative costs) is the real target.

Figure 3: Maui County Road Usage Charge and Excise Fuel Tax Comparison



Honolulu City & County’s low fuel tax related cents-per-mile-driven of 0.75 cent-per-mile-driven in 2020 will decrease to just over half a cent to 0.57 cent-per-mile-driven by 2030. A revenue-neutral RUC’s cent-per-mile-driven in Honolulu City & County will stay the same at 0.75 cent for the entire decade.

Figure 4: Honolulu City & County Road Usage Charge and Excise Fuel Tax Comparison



5.4. Net revenues

To determine net revenues, a county must also consider the cost of tax collection. Although the Department of Taxation does not provide estimate costs of administration for distinct types of taxes it collects, the experience with fuel tax collection elsewhere suggests the cost is a small proportion of gross revenues—amounting to less than one percent—given that the tax is collected at the wholesale level from distributors. Since the county fuel tax is collected along with the state fuel tax, the administrative cost will be likely the same.

If the cost of collection is less than one percent of gross fuel tax revenue, a county will find it challenging to come near that level of collection cost if a county-level RUC resembles systems developed in other states. Research in other states shows that RUC systems require large numbers of payers to decrease the relative collection cost for RUC per mile. Due to its higher population, Honolulu City & County offers the best economy of scale; the cost of collection is anticipated to be higher for the other counties that have a smaller number of registered vehicles. Alternatively, a county that accesses the existing PMVI program for mileage reporting may find a much lower cost of collection for RUC, even compared to mainland states with larger populations.

If, on the other hand, a county were to combine a county RUC program with state RUC, sharing the collection cost could make it less expensive for a county RUC. The cost of county RUC in such a scenario would be largely a matter of negotiation between the county and the state.

6. Conclusion

Given the impending drop in county fuel tax revenues in the coming decade, owing to increases in vehicle fuel efficiency in the near term, Hawaii's counties may need to consider alternatives to the fuel tax for funding county roads. Increasing the county fuel tax rate alone is not an attractive option given the impact on drivers with older, less fuel-efficient vehicles. A RUC may prove a viable option for counties looking for a fair and sustainable option to maintain road revenues in the coming decades.

Combining a county RUC program with a state RUC system could be a viable approach for a county seeking to replace its excise fuel tax with county RUC on driving within the county. Although Hawaii has researched RUC, there is no such system in place yet. For a county to implement RUC before a state RUC happens, the county would have to implement a county-only RUC system.

There are numerous policy and practical issues for a county to consider before implementing a RUC system, alone or in conjunction with the state. Public outreach would be a significant first step, followed by the issues of setting the RUC rate and managing the cost of administration, among other considerations. Counties will find keeping the cost of administration down is an essential factor to maintaining sufficient revenue levels in a RUC system as compared to the fuel tax system.

If one or more counties moves to implement a RUC system in the absence of a state system, to keep the cost of collection down, they should consider accessing existing systems such as the motor vehicle registry and PMVI odometer data legacy systems to identify vehicles subject to RUC and gather the necessary data for calculating charges.

There is much that is still unknown about a county implementing RUC. Should the state implement a RUC program, the counties may find a viable option for combining a county RUC program with the state RUC after further research and deliberation. If not, then the option of county-only RUC requires a fair amount of *additional* policy and implementation decisions that can be supported further by local, county-level research.