## HAWAII DOT FEASIBILITY STUDY FOR IMPLEMENTING A STATEWIDE MILEAGE-BASED USER FEE

Prepared by D'Artagnan Consulting

May 29, 2016







#### About this report format

The results of the Mileage-Based User Fee Feasibility Study are provided to the Hawaii Department of Transportation in the format of an executive-level briefing book. This briefing book is designed to provide more in-depth information than presentation slides, but not as dense and time-consuming to read as a technical report. The format is one concept, idea, or point per page, to facilitate faster review of the material. In principle, reading only the heading on each page is equivalent to reading an executive summary, yet allow readers to more closely examine the contents of any particular page of interest.

This briefing book is intended to provide background information to HDOT, colleagues from the counties of Hawaii, and other key stakeholders on the current status of mileage based user fees (or "road use charges") around the U.S. and globally.



#### Contents

Executive	Summary1	I
Section 1:	Objectives and scope of Hawaii DOT's mileage based feasibility study	
Section 2:	Fuel consumption and long-term transportation funding trends5	-
Section 3:	Mileage-based user fees at-a-glance	)
Section 4:	Road use charging initiatives in other states and countries	;
Section 5:	Summary of Issues Affecting RUC Feasibility in Hawaii	7
Section 6:	Policy Issues Affecting RUC Feasibility in Hawaii	)
Section 7:	Operational Issues Affecting RUC Feasibility in Hawaii70	)
Section 8:	Financial Dimensions of Road Use Charge Feasibility in Hawaii	2
Section 9:	Public Acceptance Factors for Road Use Charge in Hawaii	)
Appendix:	Project Work Plan Description	
Endnotes	129	



## **Executive Summary**

**Executive Summary** 



The report documents work in support of a robust feasibility determination by the Hawaii Department of Transportation (HDOT) regarding per-mile road usage charging (RUC). As Hawaii's vehicle fleet consumes less fuel by transitioning to more fuel efficient and alternative fuel vehicles (consistent with state energy objectives), state gas tax revenues are declining. RUC is a public funding policy of assessing fees based on distance traveled across a road network to generate transportation revenue. As one alternative for sustainable revenue, RUC ensures that motorists contribute equitably based on road usage, regardless of vehicle type. Many issues affect whether RUC is feasible for the State of Hawaii. This report summarizes policy, operational, financial, and public acceptance issues.

Policy issues span many topics, reflected in part by the questions below:

- 1. How does the financial sustainability of RUC compare to fuel taxes?
- 2. How does a per-mile fee relate to energy and environmental policy initiatives in Hawaii?
- 3. Will a per-mile charge be fair to long-distance commuters and rural residents?
- 4. Can a per-mile charge ensure that visitors pay their fair share for miles driven in Hawaii?
- 5. What are the implications of a per-mile charge for Hawaii's counties?
- 6. Are there ways to mitigate the burden of transitioning from incremental gas tax payments to periodic lump sum RUC?
- 7. Can potential double-taxation (gas tax in addition to a per-mile charge) be avoided?
- 8. What are the implications of a per-mile charge for state-issued highway bonds those already issued, as well as future issuances?
- 9. Should tax exemptions and refunds be allowed in a per-mile system in Hawaii?

The study identified a range of policy design choices that could address each of these questions. Many of the policy issues can be addressed through analysis, but some require further analysis based on direct testing of motorist experiences.



**Operational issues** relate to the ability of the state to implement and operate a RUC. The three basic elements of an operational RUC program already exist in Hawaii: reporting of mileage driven by individual vehicles, collection of vehicle-based fees, and enforcement of payments. For Hawaii, odometer charging is the lowest-barrier operational concept to implement, but a mileage permit could provide motorists greater payment flexibility than an odometer charge. Meanwhile, automated mileage reporting approaches could be desirable to some motorists, based on a range of available technologies. Choices must be made about what reporting methods, payment frequencies and payment methods to offer, and whether and how to combine RUC with other user-based fees. Most of the operational issues can be addressed through testing.

**Financial issues** for RUC are wide ranging, but this effort focused on two: (1) weighing the benefits of more sustainable, equitable revenue against the higher cost of collection, relative to gas taxes, and (2) analyzing the impact of RUC on motorists who travel long distances.

1. Historically, Hawaii has enjoyed stable, reliable highway funding, with fuel taxes as the largest single source of state transportation revenue. Recently, fuel tax revenues have begun to decline as residents use more fuel-efficient cars. Future gas tax receipts are expected to remain flat or decline as Hawaii's vehicle fleet becomes more efficient. Raising gas taxes to counteract this trend would lead to increasingly inequitable contributions to road funding among Hawaii's residents. By contrast, per-mile fees have the potential to restore both the reliability and fairness of highway funding with payments based on usage. On the other hand, per-mile fees are likely to be costlier for the state to administer than fuel taxes. Hawaii's current processes for vehicle inspection and registration could provide cost advantages over other methods of administering a per-mile fee. Based on several scenarios combining various possible policy and operational choices, costs of collection for a per-mile fee in Hawaii range from 5-13%.



2. A second issue is the perception that RUC will be unfair to rural motorists who drive long distances. Spatial fleet analysis reveals that residents of rural ZIP codes have consistently lower miles per gallon (MPG) vehicles than residents of urban ZIP codes, meaning that they currently pay more per mile in gas taxes than they would pay under RUC.

**Public acceptance** issues are well known in states that have pursued RUC studies and pilots. Public opinion research from these states reveals a general lack of knowledge about transportation revenue generally and RUC specifically. Hawaii public attitudes toward per-mile fees are likely similar to other states: initial skepticism, with concerns about privacy, fairness, and operating costs. However, more research is needed to probe potential variations from trends in other states because of Hawaii's several unique characteristics that may distinguish attitudes. In general, research shows that public acceptance improves – in some cases, to majority support – with greater issue understanding, familiarity and exposure to per-mile fee systems.

Hawaii's unique features such as island geography and the existing vehicle inspection program present fewer obstacles to RUC than other states. The concept of an odometer charge, in particular, is achievable on a large scale. Still, policy questions, operational details, financial analysis, and public acceptance factors remain to be addressed before Hawaii can move forward. Each of the issues identified in this feasibility study –policy, operational, financial, and public acceptance – on its own has a potential resolution. The challenge for Hawaii is to conduct further analysis, testing, and stakeholder engagement to find an acceptable combination of resolutions.



## Section 1: Objectives and scope of Hawaii DOT's mileage based feasibility study

## The objective of Hawaii DOT's study is to make a robust feasibility determination

From the scope of work in the request for quotations for this study:

The objective of the study is to research and analyze all aspects of the current fuel tax issue, as well as provide the necessary information needed to determine the feasibility of implementing a statewide mileage-based user fee for revenue generation throughout the State of Hawaii. The study will require in-depth coordination within the HDOT and include any concerns or impacts of a mileage-based user fee on stakeholders and the general public.

In order to fulfill the objective of the study, the project team has organized four distinct work streams to support HDOT analysis and decision-making.

2





The primary objective of this study is to determine whether a RUC is a feasible transportation revenue alternative for the State of Hawaii. To make a well-informed determination, Hawaii public officials reviewed and considered detailed information that was collected, analyzed, and presented throughout the course of this project. The Scope of Work that provided this information is organized around four main Work Streams:

#### Work Stream 1 – Financial Analysis:

Analyze and compare performance of the motor fuel tax against a potential RUC, particularly in light of Hawaii's roadway funding needs. The project team collected the latest available revenue and cost information from HDOT and other State of Hawaii sources, as well as Federal sources, to conduct the motor fuel tax and RUC analysis using proven analytical frameworks.

#### Work Stream 2 – Operational Approaches:

Assess mileage reporting methods and operational concepts most promising for Hawaii's unique geography, policy environment, and vehicle regulation and registration system. The project team researched and presented all mileage-reporting methods, technologies, and supporting services that are known to be available. This constituted background on operational concepts for consideration by HDOT officials before selecting preferred alternatives for the final recommendations and presentation to the Legislature.

## Four distinct work streams provided information to determine feasibility (continued)

#### Work Stream 3 – Acceptance Factors:

Consider likely public opinion and potential customer acceptance factors for various RUC approaches. The project team identified and incorporated existing public opinion information related to transportation funding in Hawaii; synthesized the large body of existing public opinion surveys conducted in Hawaii and nationally, with special emphasis on the large amount of publicly-available data from RUC surveys; and extrapolated this information to identify likely public acceptance factors and issues most important to Hawaii residents when considering a potential RUC system.

#### Work Stream 4: Policy Issues:

Identify policy issues and recommended policy parameters for introducing RUC in Hawaii. The project team carefully identified and documented all issues that could affect the feasibility, desirability, and acceptability of RUC for the State of Hawaii. Although these are labeled "policy issues," we documented technical, legal, and operational issues as well. While the feasibility study does not fully resolve all identified issues, this final report prioritizes unresolved issues, provides background on each, and outlines alternative approaches to be addressed in the future should the State of Hawaii pursue RUC.





## Section 2: Fuel consumption and long-term transportation funding trends



#### Federal CAFE standards are driving improvements in fleet fuel efficiency, which is expected to reduce fuel consumption and erode Hawaii's state gas tax revenue per mile driven

Fuel taxes are the largest single source of funds to support Hawaii's roads and highways, generating nearly \$100 million per year, about one third of state revenues for roads. In the future, fuel tax receipts per mile driven are expected to decline as fuel economy improves and alternative fuel vehicles enter the fleet. The figure below, left, illustrates Federal CAFE standards for passenger cars and light trucks from 1978 through 2025. The figure below, right, illustrates the implications of CAFE standards for on-road fuel economy (solid green line corresponding with the left axis) based on the U.S. Energy Information Administration's 2015 *Annual Energy Outlook*. In turn, the implications of MPG improvements on Hawaii's 16-cent state fuel tax receipts per mile driven are shown as a dotted red line corresponding with the right axis.





## Other states are studying fuel tax trends and examining alternatives, including road use charges

Fuel tax revenue per mile driven has declined since about 2008 due to improvements in fleet MPG. Per-mile revenue will continue to decline as high MPG vehicles enter the fleet in greater numbers. For example, Utah, Oregon, and Washington have examined the impact of new vehicles on fuel tax revenue (see charts below and at right). Based on analysis by the consultant of state-level activities, more than 25 states have examined ways of stabilizing fuel tax revenue over the past several years.





Future Fuel Tax Revenues in Utah, May 2015





#### As one alternative for sustainable revenue, road use charging ensures that motorists contribute equitably regardless of vehicle type



Fuel taxes were designed to approximate road use: the more you drive, the more fuel you consume, the more tax you pay. Over most of the past century, the majority of passenger cars had similar fuel economy, meaning that motorists were paying approximately the same amount per mile driven regardless of the type of vehicle they drove.

As high MPG vehicles enter the fleet and erode fuel tax revenues, one potential solution is to raise fuel tax rates (cents per

gallon). Continuous increases in the fuel tax rate per gallon could offset the erosion of revenue due to high MPG vehicles. However, this has an impact on equity, as new vehicles use very little or no fuel at all, while older vehicles continue to burn fuel at higher rates. This leads to an imbalance whereby some motorists pay more for the roads per mile driven in fuel taxes while other pay little or nothing, despite occupying similar space in traffic, causing equal levels of road wear and tear, and utilizing similar amounts of roadway lighting and signage. Road use charges can correct this imbalance by ensuring that vehicles pay the same per mile, regardless of fuel source.



## Section 3: Mileage-based user fees at-a-glance



## Road use charging (RUC) is a policy of assessing fees based on distance traveled across a road network, 24/7, to generate transportation revenue

Highway agencies require a reliable, sustainable revenue stream to construct and maintain roads. Road use charging (RUC) would create this revenue stream while allocating costs to road users in proportion to their actual roadway usage. RUC, for purposes of this feasibility assessment, has the following features:

- Network wide. RUC is assessed across an entire network of facilities, including all roadways in a jurisdiction, rather than for a single facility, corridor, or "trunk line" as is often the case in tolling.
- Charged 24 / 7. Charges would be assessed regardless of the time of use. In this respect, RUC is akin to a basic utility model (such as electricity or water) or any other consumer product in which the user of a good or service is expected to pay for it at the time of use.
- For general network use. Revenue allocation would span a broad region or State, rather than a single facility or limited jurisdiction.



#### User fees for transportation revenue generation vary around the world

TYPE OF CHARGING	EXAMPLES	PRIMARY POLICY OBJECTIVES
<b>Fuel taxes</b> . Usually fixed rate per amount of fuel purchased.	Worldwide	<b>Revenue generation for a network of roads</b> through user fees based on fuel consumed by a subset of vehicles (e.g., gas, diesel). Rarely linked to externalities such as emissions or congestion.
<b>Tolls</b> . User fee for driving on a particular bridge, tunnel, or road, including express lanes	Worldwide	Revenue generation for a specific road, bridge, or tunnel through user fees based on vehicle type (size, weight, axles), distance travelled, and, in some cases, time of day. Provide a faster and / or more reliable option using express toll lanes.
<b>Congestion charging</b> (e.g., cordon charges, area charges). A charge to enter or drive within a limited area – typically a congested downtown core	<i>In Operation</i> : Norway (various cities), Singapore (strategic road network), London (area), Stockholm (cordon), Italy (preserve historic urban centers) <i>Major Studies</i> : Hong Kong, NYC, San Francisco, Los Angeles, Manchester, Auckland	Manage congestion, improve speeds. Generate revenues through direct user fees based on vehicle type and time of day, sometimes directional and seasonal. Discourage driving and encourage shift to non-driving modes.
Road use charging (for trucks)	In Operation: U.S. (OR, NM, NY, KY), New Zealand, Switzerland, Austria, Germany, Australia, Czech Republic, Slovakia, Poland, France, Belgium Major Studies: Sweden (Arena), UK	<b>Revenue generation for a network of roads</b> through user fees on the subset of the fleet that is heavy vehicles. Typically assessed by vehicle size, weight of freight carried, engine type, and sometimes other externalities.
Road use charging (for light vehicles)	In Operation: New Zealand (diesel only), Oregon (voluntary program) Vignettes in Operation: Austria, Belgium (2013), Bulgaria, Czech Republic, Hungary, Romania, Slovakia, Slovenia, Switzerland Major Studies: Netherlands, U.S. (OR, WA, CA, MN, CO, I-95)	<b>Revenue generation for a network of roads</b> through user fees based on distance travelled by a subset of light vehicles (e.g., New Zealand on diesel vehicles) or time spent on the road network (e.g., Eurovignette).



#### **RUC** is distinct from other types of road fees

There are many reasons to assess fees or taxes on road users, and many ways to implement them in practice. Reasons include revenue generation for roads, revenue generation for other purposes, congestion management, and environmental protection. Types of charges include fuel taxes, tolling, congestion-based charging, and RUC.

Practitioners often use terms such as tolling, congestion pricing, and RUC interchangeably, but there are substantive differences among them, and it is easy to get confused. Below are brief descriptions of four forms of charging in order to clarify the differences.

- Fuel tax. Charges assessed on fuel consumed by road users. Unlike the other three examples below, the fuel tax is an indirect user fee drivers pay based on fuel consumed as a proxy for actual road use.
- Toll. Charges assessed on users of a specific highway, bridge, or tunnel, including express toll lanes.
- Congestion charging. Charges assessed during specific times and at specific places to change travel behavior and manage congestion.
- Road use charges. Charges assessed across the entire network of roads based on distance driven to generate revenue to pay for construction, maintenance, and operations of a road network.



#### RUC is not congestion charging, tolling, or express toll lanes

RUC is distinct from congestion charging, tolling, and express toll lane charging. Differential levels of service offered by express lanes, behavior-modifying mechanisms such as congestion charging, and environmental impact fees are separate policy mechanisms that, while related to road use, are not part of RUC as presently defined for this assessment.

- Congestion charging. Congestion charging is designed to address congestion and is limited in scope or area to congested zones or corridors in urbanized areas or other heavily travelled routes.
- Tolling. Road tolling is specific to particular facilities. Charges apply only to defined points or segments including bridges and tunnels. Especially when managed by special purpose agencies or private entities, revenues are dedicated to the tolled facility or other narrowly specified uses and rarely to a highway or transportation network.
- Express lanes. Like tolling, express lanes (or "HOT" lanes in the U.S.) involve facilityspecific charges. There is limited revenue opportunity. Charges often combine revenue with secondary objectives of congestion management or abatement.



#### Policy dimensions of RUC span several topic areas

The table below is a partial list of policy issues or questions that must be addressed as part of a RUC program development, categorized by topic area as financial, legal, rate-related, equity, or relationship to objectives other than revenue. The purpose of this briefing book (and of feasibility study as a whole) is not to answer each question or resolve each issue. Instead, HDOT will explore and prioritize these policy issues for Hawaii, identify resources and stakeholders that can address each question, develop alternative approaches, and assess overall feasibility of RUC as a policy.

FINANCIAL	LEGAL	RATE RELATED	EQUITY	RELATIONSHIP TO OBJECTIVES OTHER THAN REVENUE
Replace vs. supplement gas tax	Fee vs. tax vs. charge	Different rates by vehicle type (e.g., weight, engine size, MPG)	Impact on rural drivers	Energy / fuel consumption
Dedication of revenue	Subject vehicles	Differential rate by location/time (requires location data)	Geographic impacts	Greenhouse gases
Distribution of revenue	Validity of distance measurement technique or method	Differential discount by location (encourages opt-in to provide location data)	Impact on non- English speaking population	Congestion
Availability or use of revenues for bonding	Enforcement tools to use	Refunds (fuel tax, private roads, off road)	Impact on visitors and tourism	Multi-modal / freight
Cost allocation	Penalties to apply	Rate-setting entity	Impact on businesses	Safety
	Commerce Clause	Rate-setting policy	Impact on low income households	
		Exemptions	Impact on persons without credit or bank accounts	



#### RUC represents a major shift in how transportation is funded

RUC is a transformational concept. It requires policy, technology, design, and business innovation. It involves the change management of highly interdependent systems interdependencies that are familiar and recognized by HDOT and the public alike. To improve one aspect of the system without considering these interdependencies may produce unexpected and unwelcome side effects in other quarters of the system. The establishment of any RUC system is complex, ambiguous, and not well suited to the straightforward



engineering progression from defining goals through designing and engineering solutions, to manufacturing/procurement of products, and system integration and deployment. Instead, progress in the development of RUC policy requires systems thinking, iterative feedback loops, and responsiveness to evolving policy preferences. The notion of RUC as a "wicked problem" is captured in the image above, in which system concepts impact various "quarters" of the system, which in turn impact one another. A more detailed glimpse at the interdependencies of RUC are captured on the next page.



#### RUC policy formulation is a classic "wicked problem" in which changes to one aspect of the system impact other aspects, often in unexpected ways





#### There are many ways to implement RUC, called operational concepts

There are many possible methods by which roadway usage can be reported and paid for. We call the various methods for recording and reporting usage **operational concepts**. In the following pages, we present seven basic RUC operational concepts.

Each of the seven operational concepts is supported by various technology components, ranging from something as simple and ubiquitous as the odometer to sophisticated in-vehicle equipment. More detail can be provided on the wide range of technologies available to support the operational concepts – including low-tech or no-technology approaches. For now, bear in mind that some technologies may support only one operational concept, while others can support multiple concepts.



#### RUC can be time-based or distance-based, and reporting road use can be manual or automated

Roadway use can be measured in both time and distance. The operational concepts presented here include two that use time as a basis for road charges, and five that use distance as a basis for RUC. Reporting road use can be done manually by the motorist, or it can be automated. With four of the concepts, the reporting task falls on the motorist, while three of the concepts are automated.

The figure below illustrates a typology of RUC operational concepts, based on various combinations of the basis of the charge (time or distance) and reporting type (manual or automated). In total, there are seven operational concepts. The following pages describe each concept in turn.



#### **Breakdown of RUC operational concepts**

Mileage-based user fees at-a-glance

### **Concept 1: Time permit**

Concept 1 is a permit that could be issued by the state that allows a motorist unlimited road use in Hawaii for a specific period, such as a year, month, or week. A common way to operationalize time permits is using stickers or decals. European vignette systems require visitors to pay for highway use by purchasing windshield stickers (see Slovenian vignette at right).

Stickers are not the only way to operationalize a time permit. Some European countries have transitioned to electronic vignettes, which works as follows:

- 1. Vehicles register their license plates with a country's RUC database
- 2. Drivers can purchase time permits via smartphone apps, in-vehicle telematics, websites, or telephone; their payment status is immediately reflected in the database.
- 3. An enforcement officer can look up the payment status of any vehicle by typing the license plate number into a computer connected to the database.

The time permit is straightforward to combine with other operational concepts as part of a package. Time permits may be desirable for those motorists who have strong concerns about reporting their annual or periodic vehicle mileage to the state.







#### **Concept 2: Engine run time**

If a vehicle's engine is running, it is likely using the road system. Because of this, engine run time is a proxy for road use. Like charging based on distance, engine run time charges people based on distance traveled. However, motorists also pay more when they sit in congestion or travel on slower roads.

For most conventional vehicles, engine vibration sensors could be installed to record time as the engine runs. While vibration sensors exist, the technology to connect a sensor to



the vehicle and transmit data to a billing entity would need to be developed. An off-the-shelf, turnkey solution is not available today. Moreover, software would need to be developed to filter vibration data to ensure that other ambient vibrations (e.g., a jackhammer) are not mistaken for a running engine.

For electric vehicles, whose engines do not vibrate, an algorithm would need to be developed to compute engine run time based on other data generated by the vehicle. The simplest algorithm would be to check if the vehicle speed is greater than 0. However, this would mean that electric vehicles would not pay for roadway use while stopped at traffic lights, for example, while conventional vehicles would pay in this case, a possible inequity.

This concept has never been implemented.



#### **Concept 3: Mileage permit**

A mileage permit is a manual-reporting concept, similar to Concept 1, the time permit—except that its basis is distance traveled instead of time. Motorists purchase blocks of miles in this concept, instead of blocks of time. The license system in New Zealand for diesel vehicles is an example of a mileage permit system (see license image at right).

Motorists could choose to buy mileage blocks in an amount that best suits their needs, habits, and



ability to pay. For example, motorists with cash constraints may choose to purchase only 1,000 miles at a time, while those with more money available could purchase larger blocks of miles (e.g., 10,000) to reduce the number of times that they have to return to purchase new blocks.

- Motorists choosing this method would need to obtain an official, certified odometer reading of their vehicles at the outset of a mileage permit program. After that, they would be responsible for purchasing additional blocks of miles before all previously purchased miles have been used.
- This concept could be combined with other concepts as part of a menu of choices for motorists to comply with road charge requirements.



#### **Concept 4: Odometer charge, post-pay**

Both this concept and Concept 5, odometer charge (pre-pay), are road charge payments based on miles traveled as measured by the vehicle odometer. The odometer can be read by a state official or representative, as is already the case in Hawaii. Alternatively, the motorist could self-report the odometer



reading, and random audits and other enforcement methods can be used to maintain compliance.

- ▶ In a post-pay concept, the motorist provides an odometer reading at the start of the year
- At the end of a specified time period, the motorist provides another odometer reading and pays the effective per-mile rate times the number of miles elapsed.
- ► The second reading serves as the baseline reading for the following year.
- Reporting and payment can occur at any retail outlet authorized by the state, such as vehicle inspections, auto service centers, or retail gas stations.

Despite the relative simplicity from a motorist perspective, post-pay has several potential disadvantages.

- Fuel taxes are collected and remitted monthly or quarterly, typically within a few weeks of the time the fuel was used to power a vehicle on the road. Odometer charges could be paid in different time frames, and a postponement could create cash flow issues for the state.
- There are several opportunities for fraud and evasion, including odometer rollback, underreporting of miles, and attempting to move out of state or sell the vehicle before paying the road charge. Consequently, odometer charges, particularly post-pay charges, require a robust compliance and enforcement effort.





#### **Concept 5: Odometer charge, pre-pay**

This concept is similar to Concept 4, except that in a pre-pay concept, motorists pay up front. It is similar to estimated income taxes, whereby taxpayers pay in advance based on estimated income.

> First, motorists would pay a road charge based on an estimate of how many miles they expect to drive in the year



ahead, or perhaps (for the first year at least) based on a fixed number of miles the state prescribes.

- At the end of the year, motorists reconcile the difference between the prepaid road charge and the amount owed based on miles actually driven. If motorists drove fewer miles than they paid for at the start of the year, they would receive a refund or account credit toward the next year. If they drove more miles than estimated, an additional payment would be due.
- Finally, the estimate of miles to be traveled in the next year might be based on the amount of miles reported in the previous year.

As with the post-pay odometer charge concept, there are several opportunities for errors and fraud including odometer rollback and underestimating of travel. In the case of gross underestimates, motorists may be required to increase their annual estimated travel in future years.

Mileage-based user fees at-a-glance

#### HAWAII DOT MILEAGE BASED USER FEE FEASIBILITY STUDY

#### **Concept 6: Automated mileage reporting with no location data**

In this concept, vehicles have equipment that measures and reports mileage automatically to an account manager—either provided by a state agency or a private company. The account manager periodically (monthly or quarterly) sends the motorist an invoice for road use.

- In the case of a private account manager, the RUC invoice may be bundled with charges for other services such as insurance, in-vehicle infotainment, or roadside services.
- In the case of a government account manager, the RUC invoice may be a standalone bill, or it may be bundled with other vehicle-related charges such as registration fees.

To reassure motorists that electronic equipment protects their privacy, no location information is needed or collected under this concept. The equipment records all miles traveled based on data from vehicle electronics, and all miles traveled are treated as equal under this concept. Credits or refunds for travel on private lands would not be possible in an automated way (although it may be possible to issue credits or refunds for miles traveled on private lands based on a paper evidence package specified by the state).

To provide especially strong reassurance to the public, equipment to support this concept may be prohibited from including any location measurement technology (i.e., no GPS chip).









#### **Concept 7: Automated mileage reporting with general location**

In this concept, vehicles are charged for distance with a rate that may vary by general location. For example, this would allow vehicles driven in Kauai to be charged a different rate than vehicles driven on Oahu. Another example is that miles driven on agricultural roads could be tax-exempt mileage, while public roadways would be subject to the road use charge.

To measure the miles traveled and the general location of those miles traveled, a device that measures location may be needed in the vehicle (depending on the variable nature of the per-mile rates). The device could allow drivers to turn location detection capabilities off and on.



Motorists who prefer this concept would avoid paying for travel on private lands, which would be charged to users of the other options.

If the need were to ever arise for a base per-mile rate to increase in certain zones within the state, then the system would require everyone to use a location measuring option (i.e., GPS), because those without location measurement devices would not be able to accurately report or pay for miles within those smaller zones.



# Section 4: Road use charging initiatives in other states and countries



#### Implementation of RUC for light-duty vehicles is limited

Though studied extensively, both by academics and by practitioners, implementation of RUC has been limited to the following examples worldwide:

- New Zealand. All diesel and other alternative fuel vehicles have been subject to RUC since 1978 using a paper-based licensing scheme in which motorists prepurchase blocks of kilometers.
- Europe. Several European nations use vignettes (stickers) that allow foreign motorists access to motorways for a designated period of time (a few days to a year).



Oregon. Following over a decade of study and two pilot tests, Oregon is moving forward with an operational RUC system that launched in July 2015, initially for 5,000 volunteer motorists, but with expectations to expand the program to include mandatory vehicles in the future.

## New Zealand has the world's most mature RUC system for light vehicles, using paper distance licenses

**1978 Startup:** In 1978, New Zealand introduced RUC on all non-gasoline vehicles as well as vehicles over 3.5 metric tons. A paper-based scheme was adopted that uses windshield-mounted sticker licenses. At the time of adoption, the number of non-gasoline passenger cars was negligible. Today, there are nearly 600,000 light-duty vehicles subject to RUC. Compliance is enforced at roadside against odometer readings, through annual safety inspections ("Warrant of Fitness"), and using a robust audit program. Police have authority to ticket motorists whose licenses are not current. As an island jurisdiction, cross-border travel is not a major issue for enforcement.



**2008 Update:** In 2008, government commissioned an independent review to



provide recommendations on updating policies and technologies associated with road charges. The following passage punctuates their findings: "A good charging system should not be discarded in the pursuit of a perfect system. The policy aim should be for a system that accomplishes as many and as much of the objectives

as possible at low cost and, from a dynamic perspective, is not so complicated that different parties are constantly tempted to chip away at various components and undermine it."

**2009 Private Sector Agents:** The government certified private sector agents to handle license sales and fee collection for motorists, many of whom now use electronic methods in lieu of paper licenses.



## New developments in New Zealand center on modernization of technology and business models for RUC reporting and payment

**2009-Present**. New Zealand is now in the midst of transitioning from its earlier paper-based RUC system to allow electronic RUC reporting and payment systems.





Offering these system choices is driven by the government's long-term goals for an open system architecture, interoperability to allow roaming throughout the country, developing the most efficient (and least cost) back office management system, and forward-compatibility with advanced payment systems.


### New Zealand's National Transportation Plan calls for future expansion of RUC to gasoline vehicles and elimination of gasoline taxes

Future. The National Transportation Plan identified the following goals and recommended actions:

- Investigate RUC for heavy vehicles, including levying charges by location and time, with a pilot test to be conducted between 2016 and 2019 by the Ministry of Transportation.
- Eliminate the gas tax and transition all light duty passenger vehicles over to RUC by 2020. Currently only diesel-powered passenger vehicles are subject to RUC.
- Assess the ability for the current system to accommodate: commercial service providers, advanced payment systems, and new technologies.

# Several European countries use vignettes (stickers) to charge for road use by visitors – an example of time-based RUC

**Paper vignettes.** A vignette is a windshield sticker that allows a vehicle to use certain roads in a country for a defined period. Frequent users typically buy a vignette that is good for a year, but shorter periods (down to a few days) are also available, depending on the country.

**Electronic vignettes.** Two countries (Hungary and Romania) have recently moved toward electronic vignettes. With an e-vignette, no physical sticker is



required. Instead, the license plate is registered with authorities for a set number of days.

**Charge for motorways only.** In most countries, the vignettes are required only to use the limited-access highway system (e.g., Autobahn).

**Tax out-of-country motorists.** All countries that have vignettes also have fuel taxes, but as fuel prices vary across Europe, and distances are short, in many cases the fuel taxes are inadequate because foreign motorists may drive through a country without purchasing any fuel.

Non-discriminatory. EU rules require that vignettes not

discriminate in design or practice. Systems must charge the same amount to everyone, regardless of nationality.



### European vignette pricing, volumes, and operational costs vary from country to country

COUNTRY	SYSTEM	NETWORK CHARGED	ANNUAL GROSS REVENUE (US \$ MILLIONS)	NUMBER OF UNITS SOLD	TOTAL OPERATING COSTS (US \$ MILLIONS)	COST AS A % OF REVENUE
Austria	Sticker	Motorway / expressways	\$494	21.2	\$7.2	1.5%
Bulgaria	Sticker	All national roads	\$20	N.A.	N.A.	N.A.
Czech Rep.	Sticker	Motorways / highways	\$167	4.8	\$17.0	10.2%
Hungary	Electronic	Motorways only	\$127	13.1	\$19.7	15.5%
Romania	Electronic	All main roads	\$114	5.7	\$6.4	5.6%
Slovakia	Sticker	Motorways / highways	\$47	3.3	\$0.3	0.6%
Slovenia	Sticker	Motorways / expressways	\$164	3.8	\$9.1	5.6%
Switzerland	Sticker	Motorways only	N.A.	N.A.	N.A.	N.A.

#### Oregon was the first U.S. jurisdiction to implement a statewide RUC program for light vehicles, called OReGO

ORe*GO* 

Oregon's RUC exploration began in 2001 with the legislature's creation of the Road User Fee Task Force (RUFTF), which oversaw a study of revenue alternatives, resulting in the recommendation to explore RUC through pilot testing.

Oregon's first pilot (2006-2007) was a technical success but did not result in policy advancement. It featured a "pay at the pump" model, using an in-vehicle device to record mileage with GPS and communicate data to the point-of-sale system at fueling stations. At fueling, participants received a mock receipt showing gas tax credits and mileage fees due. The reliance on a single GPS-based device created public concerns about privacy, and the emergence of all-electric and plug-in hybrid vehicles raised doubts that a pay-at-the-pump

model could keep up with a vehicle fleet trending away from fossil fuels.

Oregon's second pilot (2012-2013) was both a technical and policy success. After several years of policy development and R&D, the second pilot demonstrated user choice, open systems, commercial account management, and no GPS mandate.

Following the success of the second pilot, the Oregon legislature enacted the nation's first permanently operational RUC program, capped initially at 5,000 volunteer motorists.





**Verizon Telematics** 

azuga

owered by

Department of Transportation



### The Oregon Road User Fee Task Force is considering recommendations to the Legislature for expanding OReGO to make it mandatory

Below are summary statistics of the ORe*GO* program. During either the 2016 or 2017 legislative session, it is anticipated that RUFTF will forward recommendations regarding evolution of the program to become mandatory for some or all vehicles. Options being considered include mandatory RUC for new vehicles only, for highly fuel-efficient vehicle only, some combination of the two, or all vehicles.

- Participation target (and cap): 5,000 total volunteers
- Original on-line volunteer signups: 2,678 vehicle owners
- Actual sign-ups, July 1, 2015 January 5, 2016: approximately 976 Oregon drivers
- Breakdown by vehicle MPG: 24% below 17 mpg; 32% with 17-22 MPG; 44% above 22 MPG.
- Mileage reporting devices chosen by volunteers: GPS devices: 72%. Non-GPS devices: 28%.
- ► Top enrolled vehicle types, by make/model: 1 Toyota Prius. 2 Ford F-150 pick-up truck

### In the wake of progress in Oregon, RUC initiatives around the U.S. have grown sharply in the past five years

Four years ago, there were very few examples of implemented RUC systems for passenger vehicles, and none in the U.S. Today, Oregon has begun RUC operations, California will begin a statewide RUC demonstration project in summer 2016, and several other states are making preparations for their own RUC demonstration projects. Like Hawaii, many other states are now actively studying the feasibility of RUC for their own unique state circumstances.

The map on the following page illustrates current RUC development around the U.S. In the pages that follow, RUC initiatives are summarized for the following states:

- California
- Minnesota
- ► Washington
- Wisconsin
- Nevada
- Colorado
- Utah
- Indiana
- Western Road Usage Charge Consortium (14 states in western U.S.)
- ► Field trials in 13 states (University of Iowa)
- ▶ I-95 Corridor Coalition (east coast of U.S.)



# Most recently, the Federal government enacted the FAST Act, which provides \$95 million in matching funds to states for RUC-related demonstrations over five years

In December 2015, Congress passed and President Obama signed into law the Fixing America's Surface Transportation (FAST) Act, the first federal reauthorization of transportation programs in over five years. Among the provisions of the FAST Act is a grant program that provides federal matching funds for states to demonstrate "user-based revenue alternatives" to the gas tax, such as RUC.



U.S. DOT will administer the program through the Federal Highway Administration (FHWA). FHWA issued a Notice of Funding Opportunity (NOFO) in March 2016, with proposals due from states by May 20, 2016 so that funds can be awarded before the end of the federal fiscal year on September 30, 2016.

The program requires a 50% non-federal match, which may consist of state funds, in-kind services, and contributions from third parties. A total of \$15 million in federal grant funding is available on a competitive basis during this year's funding cycle.



#### RUC initiatives span the U.S. but vary in level of interest and effort





# California's Road Charge Pilot Program will test various concepts to inform policy makers about future revenue alternatives (2014-2017)

The California Legislature enacted a law directing the design and implementation of a RUC pilot test, with results due back in 2017 to inform future legislative direction on funding alternatives.

#### Four primary activities to prepare for the pilot test



Under the direction of a 15-member Technical Advisory Committee (TAC), the California Road Charge Pilot Program has completed a yearlong public input and design process. They are now moving forward with a statewide pilot test of 5,000 volunteers beginning Summer 2016. The purpose of the pilot program is to test various road charging policies and concepts.

#### Key features of the California Road Charge Pilot

Caltrans will carry out the 9-month long statewide pilot test with the assistance of an array of consultant and contractor support:

- Participants can choose from among six different methods of paying the road charge, ranging from simple, paper-based permits to using the vehicle's telematics system to automate mileage reporting.
- No actual money will be exchanged; instead, participants will receive invoices but owe nothing for their mileage.
- An extensive evaluation of the pilot will be conducted to assess how the California system performs against policy criteria selected by the oversight committee (TAC).

HAWAII DOT MILEAGE BASED USER FEE FEASIBILITY STUDY

#### Minnesota conducted research, outreach, and trials (2004-2012)

In 2004, Minnesota DOT (MnDOT) began studying RUC through a trial of pay-as-you-drive insurance and car leasing with 100 participants, demonstrating that per-mile charging is feasible as a concept. In 2009, MnDOT concluding the following based on surveys and focus groups:

- Initially, the public tends to favor non-technology options for road charge payment.
- Agencies should anticipate initial reservations from the public, as a natural reaction to change.



- Agencies should emphasize that road use charging is similar to the gas tax as a "user pays" fee.
- Uncertainty breeds apprehension. Agencies should wait until they have a substantially developed model to create communications to the public.

In 2011, MnDOT conducted a Road Fee test with 500 participants paying charges with rates varying by zone and time of day through a smartphone app that communicated through a device installed in the vehicle's data port. The Mileage-Based User Fee Task Force found road charging to be financially sustainable, equitable to various driver groups, and technically feasible.

Some of the participants reported billing errors, missed mileage, and technical glitches with the smartphone app. Simultaneously, a minority report from the Task Force was critical of road charges. Reliance on a single approach to measuring, reporting, and paying road charges was one of the key factors leading to these issues. Minnesota's legislature has not authorized further study of road charges.



#### After examining RUC since 2012, a Steering Committee in Washington State recommended moving forward with a demonstration (2012-Present)

The Washington State legislature established a Steering Committee to examine road charges in 2012. In each year from 2012-2015, the Committee successively determined the following: RUC is feasible, there is a business case to pursue it, and a combined pilot test and outreach effort should be undertaken to fine tune the Committee's working policy assumptions and recommendations. The Steering Committee endorsed the following four approaches for a demonstration:



- ► **Time Permit**: unlimited driving for a specified time period (e.g., one year) for a flat fee
- Odometer Charge: prepayment of RUC for one year based on estimated or assumed miles to be driven, with reconciliation at year's end based on actual odometer reading
- Automated Distance Charge: payment of RUC based on actual miles driven as measured by an in-vehicle device
- Smartphone App: payment of RUC charges based on actual miles driven as measured by a smartphone app that connects to the vehicle's onboard computer and/or using certified photos of the vehicle odometer





### Other states have examined odometer-based RUC at annual vehicle registration (Wisconsin) and pay-at-the-pump RUC (Nevada)

#### Wisconsin

Wisconsin's bi-partisan Transportation & Policy Finance Commission researched mileage-based registration fees and developed a framework for a potential low-tech approach. The Commission recommended it along with a five-cent increase in the gas tax to the Governor and legislature, but no action has been taken on either revenue source. However, the legislature is considering a proposal that would allow Wisconsin DOT to require drivers to report their annual odometer readings at the time of registration. This is intended to



provide the state with important data for studying how much money could be raised from a mileage-



#### based vehicle registration fee.

Nevada was among the first states to research and test a potential road use charge. Nevada DOT carried out the effort solely as a research project, in partnership with the University of Nevada-Las Vegas, so no legislative authorization was required. Nevada DOT earmarked \$1 million from their annual allotment of federal research funding (SPR funds, State Program Research) to conduct the research, which included a pilot test of a road use charge. A second

pilot had been planned that would have tested a new pay-at-the-pump method but that concept has not moved forward.

### Colorado is launching a pilot in 2016, while Utah continues to examine funding policy issues and alternatives

#### Colorado

In 2015, Colorado DOT announced plans for a small RUC pilot involving 100 volunteer motorists testing automated reporting using OBD-II plug-in devices, expected to launch in 2016. Like Oregon's first pilot and the pilot about to commence in California, participants would

not pay actual money to CDOT but would instead receive a monthly or quarterly billing that shows how much would be owed at a rate of 1.5 cents per mile, versus what they paid in the state's gas tax. Like Nevada, Colorado intends to conduct this small-scale pilot strictly as a research project within

available funds, rather than seeking a comprehensive statewide test that might require legislative authorization and additional funding.

#### Utah

Utah DOT is active in researching RUC and related policy implications. In May 2015, UDOT completed analysis of the potential impacts of highmileage vehicles on their projected state transportation funds, which are

heavily reliant on gas taxes. The state recently increased its gas tax by five cents (effective January 1, 2016), and authorized a local-option county sales tax increase of .25% to fund transportation. The local option sales tax, in particular, drew criticism from the Utah Taxpayers Association because it is not a user fee and not tied to use of the transportation system. The Utah Taxpayers Association has instead urged consideration of a mileage-based fee. Utah DOT officials are considering the best approach to exploring RUC in more detail.









### Indiana conducted a comprehensive analysis of alternatives ranging from fuel taxes to sales taxes to tolls to RUC (2014-2015)

#### Indiana

The Indiana legislature directed Indiana DOT to conduct an analysis of potential alternative revenue mechanisms that could help address the state's transportation infrastructure. INDOT studied a variety of traditional and innovative funding methods to address the infrastructure-funding gap, over 50 alternatives. Among the few mechanisms that appeared most viable for the state were increases in fuel taxes, RUC for passenger vehicles, and a RUC specifically for trucks (a combination of weight and distance), and widespread tolling of Interstate highways.



Of note, as part of its analysis, Indiana examined the level of funding needed to maintain the state and local highway systems under various scenarios. This allowed INDOT to understand more precisely the rates required of various funding alternatives (e.g., cents per gallon of fuel tax, cents per mile of RUC).

#### Western Road Usage Charge Consortium conducts pooled-fund research

The Western Road Usage Charge Consortium (WRUCC) is a voluntary coalition of Departments of Transportation that are collaborating on research and development for RUC systems. The Consortium was formed to develop expertise and preparedness within public agencies and to facilitate resource sharing for research and projects of mutual interest. The Consortium also functions as a best practices forum for sharing information and lessons learned.

#### Completed projects

- > Addressing out-of-state drivers in a RUC system (phase 1 of 2)
- > Critical examination of Oregon RUC program
- > Impacts of changing vehicle fleet fuel economy on state transportation funding
- > RUC communications task force (ongoing)
- > Key elements for a multi-state RUC certification program (phase 1 of 2)

#### Projects underway

- > Protection of privacy in a RUC system
- > Key elements for a multi-state RUC certification program (phase 2 of 2)
- > Addressing out-of-state drivers in a RUC system (phase 2 of 2)
- > Roadmap for state consideration of a RUC system
- > Effects of a RUC on rural residents
- > Web-based cost of transportation calculator





#### University of Iowa conducted field trials of GPS-based RUC (2008-2010)

Professors David Forkenbrock and Paul Hanley at the University of Iowa published groundbreaking RUC policy studies in the early 2000s. Later the University received a federal grant to run a major field trial of RUC, which had the following characteristics:

- 2 years (2008-2010)
- ► 2,650 participants from 12 different regions
- GPS-based on-board unit, recorded total miles driven in each state by participants
- Per-mile charges varied by state / municipality and vehicle class as follows:



- > 20 vehicle classes. Differences between classes were based on EPA fuel consumption and emissions data.
- > Charges ranged from 0.33 cents to 2.19 cents per mile (\$0.0033-0.0219).

Throughout the trial, researchers surveyed participants on their opinions of the system. They found that participants' opinion of the system improved over time. In general, those who were initially undecided or neutral towards the system became favorably disposed towards it.

TIME OF	OPINION OF ROAD USE CHARGING					
SURVEY	FAVORABLE	NEUTRAL	UNFAVORABLE			
Pre-trial	42%	41%	17%			
Post-trial	70%	11%	19%			



#### The I-95 Corridor Coalition developed a Concept of Operations for multistate RUC (2012)

The I-95 Corridor Coalition is an organization of toll authorities, state DOTs, and other transportation agencies from Florida to Maine. In 2009, the Coalition launched a study of multijurisdictional RUC. Given the smaller size of East Coast states and higher frequencies of cross-border travel relative to Western states, it is likely that RUC would develop as a regional effort.

The study resulted in a high-level concept of operations (ConOps) for multistate RUC, concluding:

- ► Multi-jurisdictional RUC are feasible.
- There are significant institutional issues that are present in a multi-jurisdictional context that must be handled through a centralized back office.

The proposed high-level system architecture is pictured at right. The architecture features:

- Mileage-Based User Fee Processing Organizations, which run the program directly with clients.
- Clearinghouses, which distribute payments and clear revenues between jurisdictions.





### Section 5: Summary of Issues Affecting RUC Feasibility in Hawaii



#### Many issues affect whether RUC is feasible for the State of Hawaii

For purposes of this study, "feasibility" means whether a mileage-based fee (Road Use Charge, or RUC) is capable of being designed, deployed, collected, and administered in a manner that is

consistent with the unique laws, policies, administrative systems, and public attitudes that exist in the State of Hawaii. A key aspect of feasibility is whether, through careful design, testing, and implementation, RUC can be shaped in a manner that is harmonious with other public policies yet remains a practical and effective method of stabilizing transportation revenue.





At this stage of consideration, even if RUC is found to be feasible, many more issues and questions must be addressed before a final decision can be made about whether transitioning away from the gas tax to a permile fee is a **desirable** policy initiative.



### Distinctions are made between policy, operational, financial, and acceptance issues

For purposes of this study, issues affecting feasibility are divided into four categories: policy, operational, financial, and acceptance.

- Policy issues are questions, challenges, or barriers to road use charging from a political, legislative, or legal standpoint. Section 6 covers a wide range of policy issues that emerged as more important during meetings with HDOT and other stakeholders.
- Operational issues include challenges or barriers to RUC from a technological or administrative perspective. Section 7 covers several approaches to administering a per-mile charge in Hawaii and introduces potential issues that could affect feasibility, as well as ways to resolve these issues.
- Financial issues include analysis of the potential revenue of RUC vs. gas taxes, on a net revenue comparison basis (i.e., net of leakage and collection costs), as well as a comparison of equity of per-mile charging and gas taxes, and other questions that can be addressed quantitatively. These issues are addressed in Section 8.
- Public acceptance includes analysis of the common questions and objections raised by the general public and elected officials when RUC has been discussed, studied, or implemented elsewhere. These issues are addressed in Section 9.



### Section 6: Policy Issues Affecting RUC Feasibility in Hawaii



#### Policy dimensions of RUC span several topic areas

The table below lists many policy issues that must be addressed as part of developing a Road Usage Charge (RUC) program. Since this current study is tightly focused on determining whether per-mile fees are feasible in Hawaii, ten issues emerged as highly salient based on initial meetings with HDOT and other stakeholders. Those ten issues are highlighted below and described in this section.

USE OF REVENUE	LEGAL	RATE SETTING	EQUITY	RELATIONSHIP TO OBJECTIVES OTHER THAN REVENUE
Replace vs. supplement gas tax	Fee vs. tax vs. charge	Different rates by vehicle type (e.g., weight, engine size, MPG)	Impact on rural drivers	Energy / fuel consumption
Dedication of revenue	Subject vehicles	Differential rate by location/time (requires location data)	Geographic impacts	Greenhouse gases
Distribution of revenue	Validity of distance measurement technique or method	Differential discount by location (encourages opt-in to provide location data)	Impact on non- English speaking population	Congestion
Availability or use of revenues for bonding	Enforcement tools to use	Refunds (fuel tax, private roads, off road)	Impact on visitors and tourism	Multi-modal / freight
Cost allocation	Penalties to apply	Rate-setting entity	Impact on businesses	Safety
	Commerce Clause	Rate-setting policy	Impact on low income households	
		Exemptions	Impact on unbanked	



Gas tax revenue is the largest contributor to the State Highway Fund (33%), but gas tax revenues are flattening, and are expected to decline on a per-mile basis into the future.

- Because the gas tax is levied as a fixed amount per gallon, it:
  - > Does not rise and fall with the price of fuel
  - > Does not keep pace with inflation
  - > Declines on a per-mile basis as vehicles become more fuel-efficient. Even if VMT increases, it is expected gas tax revenues will decrease.

A mileage-based charge stabilizes revenue by tying transportation revenue to road use, not gallons of gas consumed.

- Revenue for road maintenance stabilizes even as the fleet becomes greener, harmonizing transportation and energy policy
- The per-mile rate need not be increased to account for declining fuel consumption
- Like electricity and water utilities, drivers would pay based on their use of Hawaii's road system

A more detailed financial analysis is found in Section 8 of this report.





### 2. How does a per-mile fee relate to energy & environmental policy initiatives in Hawaii?

#### The State of Hawaii is striving for a clean, sustainable and secure energy future

The State of Hawaii faces unique energy challenges, given its long supply chain distance from mineral-based fuel sources such as coal, oil, and natural gas. To achieve energy independence, residents of Hawaii must have economically viable alternatives to these fossil fuel sources. Fortunately, the state has several natural attributes conducive to promoting clean, renewable and locally-produced fuel in the form of electricity from solar, wind, hydro, and geothermal sources. Act 97 (2015) set in statute the goal of 100 percent Renewable Portfolio Standard (RPS) by 2045, while Act 38 (2015) requires that State facility systems planning support increased energy security and self-sufficiency through reduced dependence on fuel imports for electrical generation and transport.<sup>1</sup>

#### Alternative fuel and high-MPG vehicles are key energy policy strategies

Transitioning Hawaii's ground transportation fleet from low MPG internal combustion engine vehicles to high MPG vehicles running on alternative fuels is an important strategy for supporting Hawaii's statewide energy policy goals. Gasoline powered vehicles with highly fuel-efficient engines, hybrid gas-electric vehicles (HEVs), plug-in electric vehicles (PEVs), and potentially hydrogen fuel cell vehicles (FCVs) are all expected to help reduce fuel consumption.

While advanced vehicle technologies are vital to achieving Hawaii's clean energy goals, the expected reduction in gasoline and diesel consumption exposes a flaw in the current method of funding roadways, which depends on liquid fuel being sold and taxed. As fuel economy improves, per-mile consumption of gasoline is expected to drop by 50% or more.<sup>2</sup> The preferred solution is to change the architecture of transportation funding, so that advancements in transportation energy policy do not have an unintended detrimental impact on surface transportation system maintenance.



### 2. How does a per-mile fee relate to energy & environmental policy initiatives in Hawaii? (continued)

The current gas tax has little effect on how many miles people drive



In the U.S., there is a perception that the gas tax is an important tool for reducing petroleum use, because the tax increases the total per-gallon price paid by consumers at the pump, thereby discouraging driving. However, the U.S. Energy Information Administration (EIA) calculates a price elasticity of gasoline consumption at -0.02, meaning the price of gasoline would have to change by 50% in order to effect travel demand (how much people drive) by 1%<sup>3</sup>. In Hawaii, the effective gas tax rate averages 32 cents per gallon (state plus county), which equates to 12% of the current price paid by consumers at the pump.<sup>4</sup> Thus, current price signals attributable to Hawaii's gas tax

(32 cents) are likely too weak (low) to significantly impact the number of miles driven. The graphic above illustrates the weak connection between total pump price and miles driven. The EIA has drawn a similar conclusion<sup>5</sup>.

## 2. How does a per-mile fee relate to energy & environmental policy initiatives in Hawaii? (continued)

### Whether a per-mile fee affects consumer purchase decisions for alternative fuel vehicles is unknown, but can be tested

Nationally, some electric vehicle (EV) advocates<sup>6</sup> have argued that a per-mile charge that applies the same permile rate to all vehicles, regardless of engine or fuel type, could discourage purchases of EVs. The same logic could be applied to other highly-efficient vehicles. The premise of this argument is that RUC negates an important consumer incentive to purchase alternative fuel and other high MPG vehicles: avoidance of gas taxes. However, as described above, current gas taxes are unlikely to be strong determinant in driving behavior. To the extent potential EV buyers make purchase decisions

Operating Cost Comparison Chart: Internal Combustion vs. Electric Vehicle in Hawaii\* CONVENTIONAL ELECTRIC VEHICLES VEHICLES an STD. 0 **\* \* \*** \$6,000 **\* \* \*** Routine Maintenance 💥 💥 \$2,000 5.0.0.0 Fuel + + + + \$10.800 0 0 0 0 0 0 4444 \$8,813 does not include the replacement of an EV battery. Warranty coverage will vary depending on ma check with your dealership or manufacturer to discuss warranty terms and conditions. 

based on operating cost savings, the majority of operating cost savings between conventional vehicles and EVs is due to reduced routine maintenance costs, followed by the commodity price advantage of electricity over gasoline. The image above from Hawaii Energy compares the cost of operating a conventional vehicle vs. an EV, driven 72,000 miles over the course of six years. If an EV paid a per-mile fee equivalent to the average state and county gas taxes in Hawaii, this would add about \$1,000 to total operating costs over six years, representing an increase of 9% to the EV driver. The EV would still maintain a 30% operating cost advantage over the gas vehicle. A field test of RUC combined with stated-preference surveys of vehicle owners in Hawaii could help to determine the extent to which per-mile fees are a factor in vehicle purchasing decisions.







# 2. How does a per-mile fee relate to energy & environmental policy initiatives in Hawaii? (continued)

#### A per-mile fee can align energy, environmental and transportation policy

The current reliance on fuel taxes to pay for the largest share of roadway maintenance costs puts transportation funding needs at odds with broader energy and environmental policy goals. Under the current tax system, policies to promote petroleum reduction and use of alternative fuels undermine stable gas tax revenue to fund the transportation system. A per-mile fee can bring transportation funding into better alignment with energy and environmental policies in Hawaii: a clean, fuel efficient vehicle fleet need not come at the expense of maintaining adequate funding for roadways. Examples of tools available to harmonize transportation taxes with energy-environmental polices:

- EV purchase incentives: According to a recent report by the National Academy of Sciences, the most influential policy tool to promote EV adoption is purchase incentives that lower the initial acquisition cost of EVs for consumers.
- Discount on vehicle registration fees or per-mile fees: If policymakers believe operating costs should be subsidized for alternative fuel vehicle drivers, then the legislature could offer a discounted vehicle registration fee for those vehicles, or potentially, adopt different per-mile rates for different vehicle types.
- Higher fees for gas-powered, low fuel economy vehicles: either registration fees or permile fees could be higher for low-MPG vehicles. If combined with the first option above, the policy would be similar to a "fee-bate" system.<sup>7</sup>

Some models<sup>8</sup> have shown that per-mile charges may help drivers conserve trips, even if the total tax paid remains at the same level as the gas tax, since consumers have more direct information about their actual cost of driving. A public demonstration project could test this hypothesis.

### 3. Will a per-mile charge be fair to long-distance commuters and rural residents?

When first hearing about a potential per-mile charge as a replacement for the gas tax, many people assume such a system would unfairly cost more to motorists who must drive long distances. This issue is of particular concern to rural residents, where the distance to the nearest grocery store, doctor, or work place is typically farther than it is for people who live in urban areas.



People who drive long distances already pay more in road taxes than other drivers, because they burn more fuel to drive extra miles. What is often overlooked is that people who must drive long distances are already contributing more to the state highway fund through gas taxes, because they consume more fuel when they're driving the extra miles.

A per-mile fee ensures that all drivers pay the same for the same miles driven. For most of the 20<sup>th</sup> century, the gas tax worked as an indirect user fee. Those who drove more paid more for their roadway use (through gas taxes). However, as vehicle fuel economy has improved, drivers now contribute different amounts for the same number of miles driven, based on the fuel economy or fuel source for their vehicle. Under the current gas tax system, there can be large variances in the amount drivers pay for the same usage, based on the type of car they own. On the following page is a comparison of three different types of vehicles each driving 10,000 miles. The only difference between these vehicles is their MPG: Toyota Prius C is 50 MPG; Nissan Frontier is 19 MPG; and the Tesla Model S has no MPG<sup>9</sup>, since it uses no gasoline. The grey and black bars show each vehicle's gas tax payments (grey is state tax only; black is state and county gas tax combined). The green bar shows what each vehicle would pay under a per-mile fee system.



### 3. Will a per-mile charge be fair to long-distance commuters and rural residents? (continued)

Studies suggest that on average, rural drivers may actually pay less under a per-mile system, depending on the age of their vehicle.

Analysis conducted in other states<sup>10</sup> indicates that on average, rural residents drive only slightly more than their urban counterparts. Even though the average trip distance tends to be farther, rural drivers make fewer trips than those living in urbanized areas.



Recent analysis of registered vehicles in Hawaii conducted for this study shows that fuel economy for rural drivers tends to be lower, resulting in rural drivers paying more for every mile driven in gas taxes (see Section 8, beginning on page 104 for more detail).

**Options for Hawaii**: More detailed analysis can be conducted of driving distances and patterns of Hawaii residents, and the potential effects (positive and negative) of transitioning away from the gas tax in favor of a per-mile charge. Such data and opinions could be gathered and analyzed in a demonstration project.



### 4. Can a per-mile charge ensure that visitors pay their fair share for miles traveled in Hawaii?

Hawaii likely has a higher proportion of miles driven by out-of-state visitors (as measured by rental car use) than most other states. In the year ending June 30, 2015, HDOT collected \$52 million in rental car fees, implying about 17.3 million rental car days in Hawaii. The total VMT in Hawaii is about 10 billion miles per year, including rental cars. The table below summarizes the relative contribution of rental car mileage under varying assumptions about mileage traveled per rental. Nationally, about 2% of all VMT are by rental cars.

Average daily miles per rental car (assumed)	Total statewide rental car VMT (2015)	Rental car VMT as a % of total (2015)
10	173 million	1.7%
20	346 million	3.5%
30	519 million	5.2%

Presently, out-of-state visitors pay gas tax when they fuel their rental vehicles. The most effective way to ensure they continue to pay their share for the upkeep of Hawaii's roads under a RUC system is to ensure that rental car agencies accurately report and pay RUC. Under a RUC, the collection of the per-mile charge would most likely fall on the rental car agencies to pay RUC

periodically to the state at the time of vehicle registration or inspection, just like all other vehicles. Rental car agencies could then either pass the cost of the mileage charge on to their customers directly, or indirectly by incorporating this new cost into their rates. In either case, in order for this aspect of RUC to be resolved, it is essential to work with rental car agencies to ensure that this important and sizeable component of statewide VMT is appropriately captured by a RUC system.



#### 5. What are the implications of a per-mile charge for Hawaii's counties?

Hawaii's counties play two important roles in state transportation policy and administration that would be impacted by RUC:

- Hawaii's counties impose a county-level fuel tax that is collected by the state Department of Taxation from fuel distributors. State gas taxes are deposited in the state highway trust fund, while county fuel taxes are deposited in each county highway trust fund. If the state desires to replace the state gas tax with a per-mile charge, a decision would also have to be made about whether or not to replace the county-level gas tax with a county-level per mile charge.
- Hawaii's counties handle vehicle registration on behalf of the state, collecting registration fees and remitting funds collected to the state. The vehicle registry itself is maintained by the City and County of Honolulu Department of Customer Services on behalf of the state.

#### Replacing county-level gas taxes with a per-mile charge

State statute defines the process for collecting county-level taxes, but refers to county-level ordinance as the mechanism to define the rate per gallon. If one or more counties wished to switch from gas tax to RUC, three issues would need to be addressed:

- State statute would need to be updated to provide the flexibility for counties to opt in to RUC.
- Counties would need to set their own per-mile rate by ordinance.
- Counties and the state would need to agree on whether to apply county-level RUC rates to vehicles regardless of the county in which they are located at the time of mileage reporting and payment, or whether to apply their "home county" per-mile rate. This is not currently an issue with fuel tax, since the tax is imposed on distributors based on where fuel is to be sold.

# 5. What are the implications of a per-mile charge for Hawaii's counties? (continued)

#### **County-level vehicle registration**

Compliance is a critical operational component of any RUC system. In turn, the state vehicle registry is an important part of assuring compliance by motorists. The vehicle registry allows the state to cross reference registered vehicles with those who have or have not paid the appropriate charges. It also represents an opportunity to enforce mileage reporting and payment, for example by using vehicle registration holds or driver license revocations as tools. The following possibilities exist for RUC's impact on vehicle registration:

- It is likely that RUC in Hawaii would have little or no impact on the vehicle registration process from the consumer perspective. Given the existence of motor vehicle inspections as an opportunity for the state to measure, collect, and/or enforce RUC payments, the vehicle registration system could continue as is, with proof of satisfactory inspection continuing as a prerequisite to registration.
- On the back end, it is possible that the vehicle registry would need to be available to the state to analyze RUC payment compliance, perform analytics, identify enforcement issues, and conduct audits or other system improvements. State-level policy decisions regarding RUC implementation and enforcement could thus impact county-level operations.
- Based on analysis to date, the requirements on the vehicle registry as part of a RUC implementation are not fully known, but they are highly likely to be feasible, especially given the existence of the vehicle inspection program. Nonetheless, it is advisable to identify essential modifications or enhancements to the vehicle registry as part of a RUC system design, whether for trial demonstration or full implementation.

### 6. Are there ways to mitigate the burden of transitioning from incremental gas tax payments to periodic lump-sum RUC?

Motorists pay the gas tax each time they purchase fuel, and so taxes are typically paid in relatively small amounts throughout the year. And, because the amount of tax paid is not shown on receipts, many motorists are unaware they are paying it. It may be challenging for some drivers to transition away from frequent, small, invisible payments to an annual lump-sum payment.

As a potential solution to this issue, motorists could have the option to pay RUC in small increments, such as monthly or quarterly.

- Pre-payments based on estimated annual mileage could be made monthly, and reconciled at the annual safety inspection
- Post-payments would divide the amount due at the annual safety inspection into monthly or quarterly payments due throughout the year
- Either way:
  - > The majority of drivers in Hawaii would pay less than \$10 per month in road use charges.
  - > Periodic payments would more closely resemble the gas tax system, where majority of drivers currently pay less than \$10 per month.





# 7. Can potential double-taxation (gas tax *in addition to* a per-mile charge) be avoided?

Questions arise whether a per-mile fee can be applied as a full replacement for the gas tax. Constituents may be concerned that a per-mile fee would be imposed as a new tax layer, in addition to the gas tax already embedded in the purchase price that drivers pay at the pump.

### A per-mile fee is being studied as a *replacement* for the state (and potentially county) gas taxes.

It is first important to examine the components of the price of fuel that consumers pay at the pump. In Hawaii, the price of fuel includes: the commodity price of the fuel itself (which includes crude oil costs, refinery costs, distribution, marketing and profits); the federal excise tax (or gas tax) of 18.4 cents per gallon collected by the IRS; the state excise tax (gas tax) of 17 cents per gallon (now 16 cents) collected by the Hawaii Department of Taxation; and county taxes which vary by county but range from a low of 8.8 cents in Hawaii county to 18 cents in County of Maui. Since the state has no authority



to repeal the federal gas tax, this component will remain in place unless Congress repeals the federal gas tax. State and local taxes are also included in the pump price, since fuel distributors already paid these taxes prior to delivery to gas stations. In Hawaii and other states, a per-mile charge is being examined *as a potential replacement for state and local taxes*.



63



### A RUC can be structured so that no driver pays a per-mile charge in addition to state and county gas taxes.

There are at least two different approaches to ensure that drivers do not pay both a per-mile charge and state and local gas taxes.

- Repeal state and local gas tax: The legislature could repeal the state gas tax at the time it authorizes collection of a per-mile charge. Recent research shows that changes in state gas tax rates are passed through to retail fuel prices fully and almost immediately.<sup>11</sup> Therefore, such a repeal should reduce the retail price of gasoline by 16 cents, and an additional amount if the county gas taxes are also repealed. This is the most immediate and efficient approach to ensure that no motorist pays a per-mile charge in addition to the gas tax. However, there are reasons why keeping gas tax collections in place for a period of time may be important.
- Provide credits for any gas tax paid: Some states have found that an immediate repeal of state gas taxes is either undesirable or would run afoul of legal requirements to keep the gas tax in place. Retaining the gas tax allows charging of out-of-state drivers for using roadways, allows a mechanism for older vehicles to continue paying for road use, and gas tax can be used as a "pre-payment" to be credited against any RUC owed. The key is making sure drivers' RUC charges are credited for any state and local gas taxes paid.





# 8. What are the implications of a per-mile charge for state-issued highway bonds – those already issued, as well as future issuances?

To pay for needed highway-related repairs and improvements, many states, including Hawaii, have issued state bonds that pledge repayment from gas taxes, either as a specific pledge of the gas tax, or as a pledge of all revenues that are deposited into a protected highway trust fund (including gas tax revenues). This practice raises two separate but related issues:

- 1. How can a per-mile fee replace the gas tax if bonds pledging repayment from those gas taxes are still outstanding a legal contract in the hands of bond investors?
- 2. For future highway financing needs, can revenue from a per-mile charge be pledged to secure the repayment of state-issued bonds?

For purposes of determining **only the feasibility of per-mile fees**, these questions are addressed in this section. However, if the State of Hawaii further pursues a RUC, it will be critical to consult with the state's bond counsel, who will carefully assess the legal implications and help formulate the best legal and financial approach for structuring a RUC so that it can be an effective revenue source for future financings.




# Answer to question 1: If bond counsel advises that the current state gas tax cannot be repealed until all bonds have been repaid, several alternatives are available

A complete analysis of the financing techniques and strategies are beyond the scope of this study to determine basic feasibility. However, several alternatives are likely available to the state, including:

Refund or refinance all outstanding gas bonds. Both of these options, if allowable under the bond covenants, could be feasible if the state has sufficient revenue streams to exercise call options or to refinance into a new instrument (one that does *not* pledge gas tax revenues). However, other options highlighted below may be more advantageous (and less complicated). Once bonds have been retired, the state gas tax could be repealed.



- Continue to collect state gas taxes only in an amount necessary to meet bond requirements. This option would continue gas tax collections, but only in an amount legally necessary to ensure that the state can make the principal and interest payments due on the bonds. Under this approach, the state could reduce the gas tax much lower than the current 16 cents per gallon, but keep it at a rate sufficient to maintain revenues that are legally required to back the bonds. As with the first option, the degree of difficulty with this option is high and would require extensive involvement from bond counsel and the state's financial advisers.
- Retain the gas tax, and treat drivers' payments of gas taxes as a credit against any per-mile fee that is owed. This option is likely to be the most financially and legally feasible,



as it keeps in place the underlying bond instruments, revenue streams and tax rates. However, it does require reconciliation between what a driver has paid in gas taxes at the pump, with the amount owed in RUC. This type of reconciliation is already conducted in the state of Oregon's RUC program, and is the most likely pathway forward in several other states, including Washington, which has bonded over 70% of its gas tax revenues.

### Answer to question 2: A per-mile fee can most easily be bonded if also backed by other revenues (and/or the state's full faith and credit).

There is a very small track record for rating agencies or bond underwriters to rely upon in assessing the strength of per-mile charges as a revenue stream. Until RUC becomes a more common source of transportation funding, it is unlikely that bonds backed only by per-mile fees will be issued. However, there are several possible approaches for RUC to grow more acceptable as bondable revenue in the next decade:

- If RUC revenues are dedicated to a highway trust fund, as the Hawaii state gas tax is, this will provide stronger assurances to bond investors that the revenue won't be diverted for other uses.
- RUC revenue, when combined and pledged with other protected revenue sources such as diesel fuel taxes, vehicle weight fees, and vehicle registration fees, is likely capable of supporting investment grade bonds.
- Retaining the existing state gas tax as a backstop for RUC revenue could be the strongest approach of all; investors retain the security of a proven revenue source (gas tax), while also gaining RUC as a more sustainable source of transportation funding.

### 9. Should tax exemptions and refunds be allowed in a per-mile system in Hawaii?

The list of exemptions, deductions and refunds of the Hawaii motor fuel tax offers a useful preview of the types of exemptions the Hawaii legislature might want to extend in a per-mile fee system. Exemptions from gas taxes include:

- ► Fuel held or in the process of export;
- ► Fuel sold to the U.S. government for official government uses; and
- ▶ Refunds of fuel taxes paid for fuel used in agricultural equipment and off public highways.

### Most of the fuel tax exemptions, deductions and refunds are unrelated to use of public roadways. Extending a mileage tax exemption would be relatively simple.

Motor fuel intended for export and fuel used in agricultural equipment off public highways are unrelated to the use of public roadways. Since agricultural equipment is exempt from fuel taxes, the legislature may wish to exempt farm vehicles used on private roadways and lands from a mileagebased fee. Calculating the number of miles traveled by such equipment on public roadways versus off public roadways may cost more to administer and report than would be collected in a mileage fee for the expected short distances that agriculture equipment might travel on public roads. Likewise, it may be most economical to grant an exemption from per-mile taxes on all agricultural equipment used exclusively on private roads and lands.

Exemptions granted to the U.S. government are common, and typically granted as a matter of reciprocity (where state and local governments have similarly been exempted from federal taxes).





# Many of the policy issues can be addressed through analysis and discussions, but some require further testing with drivers

As discussed in the preceding pages, there are a number of policy issues that must be addressed in order for RUC to be implemented. Resolving the policy issues outlined requires some combination of the following activities at minimum:

- Discuss the various policy issues and alternatives for addressing them with state and county level policy makers and officials.
- Hold conversations with legal advisors about the best way to structure a RUC with respect to bonds, exemptions, and other legal issues.
- Analyze and present objective findings related to the financial impact of RUC, its impact on urban vs. rural and other long-distance motorists, and its impact on visitors.
- Craft mutually agreeable policy language that could ultimately be made into statute about the introduction of RUC and possibly also the removal or repurposing of the gas tax.

In short, the policy issues identified and prioritized to date are important to address, and they represent difficult choices that may involve making trade-offs.



### Section 7: Operational Issues Affecting RUC Feasibility in Hawaii

## The three basic elements of an operational RUC program already exist in Hawaii

RUC operations include three basic elements: reporting of distance traveled by motorists, fee collection, and enforcement. The State of Hawaii already has systems in place that do all three of these things in one form or another:

- Mileage reporting occurs as part of the annual vehicle inspection process, when safety inspectors record vehicle odometer readings.
- ► Fee collection from motorists occurs in at least two instances annually: between customers and safety inspectors, and between customers and county DMVs for vehicle registration.
- Enforcement by county police of driving and vehicle safety laws, including requiring proof of valid inspection and registration.

Demonstrating the operational feasibility of RUC, then, may seem somewhat trivial, given the existence of these three elements. However, a functional RUC system must integrate these three activities into a single program while still respecting policy preferences that may emerge from the design of the program.

The remainder of this section introduces various operational concepts, each of which combines a mileage reporting and fee collection approach.





#### **Operational concepts can be manual or automated**

Hawaii's vehicle inspection program is effectively a manual approach that relies on an inspector physically reading the vehicle odometer. There are, however, other manual methods to mileage reporting. In addition, there are several automated approaches to mileage reporting.

#### Manual approaches

- > Odometer charge Mileage is recorded by the vehicle odometer, with reporting and payment periodically either by the motorist or by certified readers, e.g., through the existing annual inspection process
- > Mileage permit Motorists purchase a distance permit for a specific number of miles (e.g., 1000, 5000). At inspection, odometer readings verify that the motorist has not exceeded the distance permit limit.

#### Automated approaches

- > Location-based charge Motorists could opt for one of several technologies available in the marketplace to report and pay for mileage traveled by location (e.g., on-road, by county) to an account manager, which may be a state agency or a private entity. Technology options include smartphones, embedded vehicle telematics, or aftermarket devices that plug in to the vehicle data port.
- > Non-location-based charge Motorists could opt for one of several technologies available in the marketplace to report and pay for total mileage traveled (regardless of location) to an account manager, which may be a state agency or a private entity. Technology options include smartphones, embedded vehicle telematics, or aftermarket devices that plug in to the vehicle data port.

#### For Hawaii, odometer charging is the easiest concept to achieve

Under this concept, road use would be recorded by vehicle odometer, which would in turn serve as the basis of the charge. Mileage could be reported by the motorists (e.g., by using a smartphone app to take a photo of the odometer) or by an official state-certified inspector. An official "start" odometer reading must be recorded.

Odometer charge can be pre-pay or post-pay.

- Post-payment requires payment at the end of the year for all miles driven based on the difference between the final odometer reading and the initial odometer reading.
- Pre-payment requires estimating the amount of mileage to be driven in a year, paying for the miles of the coming year upfront, and reconciling at the end of the year when paying for the following year's mileage.
- Installment payments are possible for both pre-payment and post-payment so that motorists are not required to pay a single, large, burdensome invoice all at once.

Potential challenges or drawbacks of odometer charge include the following:

- ► There is potential for odometer fraud (digital odometer rollback).
- Under a post-payment system, administrative mechanisms may be desired to prevent individuals from moving out-of-state or selling a vehicle before paying the charge.
- If the gas tax remains in place, a procedure must be developed to estimate an appropriate gas tax credit for customers paying an odometer charge.
- The state would need an agreement with inspectors to collect and remit charges and/or develop the ability to collect charges from motorists using another mechanism.





#### A mileage permit could provide motorists greater payment flexibility than an odometer charge

The other manual approach, a mileage permit, basically functions as a pre-paid distance license.

- Motorist records an initial odometer reading with the state;
- Motorist purchases a mileage permit in any denomination desired (e.g., 1,000 or 10,000 miles) and is given a paper or electronic "license" to operate their vehicle until their odometer reaches the limit purchased;
- Enforcement of mileage permits could occur at annual inspection, as a means of ensuring that motorists have not "over-run" their permits.

The New Zealand RUC system features pre-paid distance permits enforced by police and at annual safety inspections. The system applies to about 500,000 diesel passenger cars. New Zealand has proven effective at enforcement of RUC and has consequently generated a stable and growing source of revenue for that nation's highway system since 1978. For Hawaii, a few issues remain:

- Operationally, the mileage permit would be similar to the odometer charge in that it could be checked at annual inspection.
- From the customer standpoint, it makes payment more flexible, since it does not require fixed periodic or annual installment payments for charges owed.
- For the state, a mileage permit system would require development and administration of transactions, optionally the printing of paper licenses or stickers, and a database of electronic mileage permits accessible to enforcement agents and safety inspectors.



#### Automated approaches could be desirable to some motorists

In order to provide automated mileage reporting and payment, motorists would need to use in-vehicle plug-in devices, embedded telematics, or smartphones to measure and report mileage to an account manager (either a state agency or a private company). Private account managers could use the relationship with the motorist to sell additional services such as usage based insurance, young driver monitoring, or a range of other services.

Location-determination technology such as GPS may be included in such devices. This technology can be used to determine off-road travel and travel by county. This feature may be helpful for vehicles that frequently travel from county to county and thus would be subject to rates that potentially vary by county and/or by vehicles that drive off-road, in the instance that the policy design of per-mile charging in Hawaii exempts off-road mile. It is worth noting, however, that motorists presently may not claim refunds or exemptions for fuel taxes paid in off-road travel.

Automated distance measurement can be prepay or post pay. In post-pay, motorists are periodically invoiced for their travel. In pre-pay, motorists are required to maintain a positive balance in their account and increase it periodically, much like a transit smartcard or toll tag.

# There is a range of technologies available to support automated mileage reporting

- 1. **OBDII mileage meters** (with and without GPS)—devices developed for usage-based insurance that plug into the vehicle testing port (On-board diagnostic 2 or OBDII ports).
- 2. **Smartphones** (GPS data may be used) and other cell phones—Motorist provided smartphones that use pictures of the odometer to verify mileage traveled, and may also allow the use of GPS to distinguish in-state/out-of-state and on-road/off-road driving. If GPS is not used, cell phones with cameras may also be used to take pictures of the odometer.
- 3. **In-vehicle Telematics** (GPS data may be used)—automaker provided telematics systems, such as GM's Onstar or Ford's Sync, that utilize digital modems to send vehicle data to motorists' accounts, which in turn can, based on a user's choice, be provided to an account manager.
- 4. **Commercial Vehicle Mileage Meters** (GPS data is typically used)—in-vehicle devices designed to provide fleet services to commercial vehicles, especially medium and heavy vehicles. As the name suggest, these are not intended for light vehicles.





### Digital odometer fraud could present an issue for a properly functioning RUC system

Odometer fraud is possible on many vehicles, using a device that can be purchased over the internet for several hundred dollars, which leaves no digital trace of the odometer modification.

There are several ways to address the prospect of odometer fraud:

- The state can analyze officially reported odometer readings with a computer algorithm to determine suspicious cases. Such cases may be investigated further.
- Motorists can be required to submit intermediate digital photos of odometers that can automatically be entered into a database to record odometer progress.
- Cases may be automatically investigated further using professional car verification services
  - > Services include Carfax, Autocheck, VINAudit, VINSMart, CheckthatVIN, InstaVIN, ReverseVINCheck, and VINAlert.
  - > Odometer readings are required each year and also at all official auto repair shops and at title transfer. The above listed services often get data from repair shops and DMV.
- Since odometer fraud is a federal felony, there are already severe penalties in place, often \$1000-\$2500 per vehicle, and even including jail time.





# Integrating mileage reporting, fee collection and enforcement requires working across several agencies and stakeholder groups

Implementing a RUC system, regardless of the operational concepts ultimately chosen, requires integrating a mileage reporting function with a payment transaction processing function and enforcement functions. In addition, on the back end, there will be a need to audit and reconcile funds collected. This set of activities likely requires working across agencies and stakeholder groups to create a smoothly functioning program, including the following:

- HDOT Administration, which would likely be responsible for ensuring the overall implementation and functioning of the program
- HDOT Highways Motor Vehicle Safety Office, which oversees the safety inspection program
- Safety inspectors
- County police
- County DMVs
- State Treasury
- Department of Taxation



### Choices must be made about reporting methods, payment frequencies, and payment methods

- Mileage reporting. In order to implement RUC, policy makers and officials would have to decide which mileage reporting methods to allow. It is possible to allow more than one method, for example to allow individuals who prefer technology to report mileage automatically.
- Payments. Policy makers or officials would have to decide on payment policies. First, how are payments collected? Options include online, in person, or via mail. Each has advantages and disadvantages. As with mileage reporting, there need not be a single "one size fits all" approach.
  - > Online payment requires maintaining a web-based payment system for all motorists that is tied to the mileage reporting. Online payment also allows customers to see their accounts, including if they have multiple vehicles in a single fleet or household, and manage periodic payments according to their preferences, should installment payments or mileage permits be allowed.
  - In-person payment could build on the existing system between safety inspectors and motorists, with the inspector collecting the per-mile fees directly from customers and remitting them to the state. Some motorists may not prefer this approach since it would require a large one-time payment. The large amount of money may also introduce complexities in the arrangement between HDOT and inspectors.
  - > *Mail payment* is similar to web-based payment, but requires HDOT to also fund printing and mailing of invoices, along with processing of checks.



#### Enforcement may require changes to statute or operating agreements

- Enforcing per-mile charges at inspection may require empowering inspectors with additional powers beyond what they currently have or, at minimum, the ability to report non-compliance with the per-mile charge to the state. Alternatively, it may require that compliance with RUC be added to statute as a prerequisite for obtaining a valid safety inspection.
- If county police are asked to enforce RUC, there are several ways to do so. One way is similar to vehicle inspection and registration: enforcement simply requires ensuring that stickers are valid. Another way, if a mileage permit operational concept is adopted, is to require police to check that the odometer reading is less than the mileage permit. In both cases, the RUC program may require additional or different levels of effort from county police, which may in turn necessitate changes to statute and/or operating agreements between HDOT and the police.



#### Operational issues can be addressed through analysis and testing

As with the policy issues summarized in Section 6, the various operational issues can be addressed through a combination of analysis, creation of initial system design options, and conversations with agencies and other stakeholders. Some issues, such as determining ideal payment mechanisms, payment frequencies, and reporting options, may require further consideration through testing in order to fully address them.



### Section 8: Financial Dimensions of Road Use Charge Feasibility in Hawaii

#### Historically, Hawaii has enjoyed relatively stable, reliable highway funding

HDOT is required by state law to generate its own revenues to fund state road and highway maintenance, preservation, and construction. Historically, funding has been relatively stable and reliable from year to year. The figure below illustrates state sources of HDOT road funding from 2000-2015 (excluding federal sources). Overall, over this time period, funding grew at an average annualized rate of 3.4%, although there are several important trends and events within this period to note:

- ▶ The period from 2000-2008 saw gradually increasing revenues, averaging 3.6% growth annually.
- ► The Great Recession of 2008-2010 saw a 13% reduction in revenues from the peak in 2008.
- ▶ From 2013-2015, revenues have grown at a relatively slow pace of 1.2%









# Fuel taxes have historically been the largest single source of statewide funding

Taking a closer look, HDOT relies on a "basket" of revenues sources. Historically, taxes on highway use fuel (gasoline, diesel, and other fuels) have composed the largest share of total road funding. Prior to the 2008 downturn, fuel taxes averaged 42% of funding per year and grew at an average annual rate of 3.4%. During that time period, fuel taxes grew at an average annual rate of at 3.4%.

Since then, however, fuel taxes have grown at an average annual rate of only 0.1% per year and now compose only 33% of total road funding. Increases in weight taxes and registration fees are responsible for the bulk of the overall increase in revenue since 2010.

2015 fuel tax revenues were actually lower than in 2011, the previous peak, despite an increase in mileage traveled over that time frame.



### Fuel tax revenues have been reliable for several decades due to flat MPG and increasing VMT

Before 2011, fuel economy of the Hawaii vehicle fleet was relatively flat, actually declining through much of the 1990s as consumers purchased larger vehicles (pickups and sport utility vehicles), but in general hovering between 18-20 MPG. Vehicle miles of travel (VMT) increased through much of this period. With fuel economy flat, fuel tax revenues increased with increasing VMT.





#### Recently, fuel tax revenues have stagnated and begun to decline as Hawaii residents purchase more fuel efficient cars

Since 2011, the vehicle fleet has grown sharply more fuel efficient. As a result, despite relatively flat VMT, overall fuel consumption (and therefore fuel tax revenue) has been flat. This phenomenon is a sharp divergence from the historical trend of reliable increases in fuel tax revenues. Although desirable for other reasons – less fuel consumption results in fewer greenhouse gas emissions, better air quality, and less reliance on imported energy – continued reduction in fuel consumption will undermine state road funding.



The chart above shows average combined (city-highway) EPA-rated MPG values by model year for passenger cars registered in Hawaii by model year. Following a period of generally flat MPG trends from 1985-2004, MPG has increased 30% from 2004-2015, including a 3% increase from 2014-2015.

### Future fuel tax receipts are expected to remain flat or decline as Hawaii's vehicle fleet becomes more efficient, regardless of VMT trends

Indeed, forecasts of future fuel consumption predict a gradual shift away from fuel consumption as automakers comply with Corporate Average Fuel Economy (CAFE) standards (see chart at right) and consumers adopt more fuel efficient and alternative fuel vehicles. If the state fuel tax remains at 16 cents per gallon, the revenue per mile driven will decline as shown in chart at left. Assuming VMT increases at a historically high rate of 2% per year on



average, overall fuel tax revenues will decline. In the



scenario depicted in the chart at right, VMT increases nearly 70% over current levels, while fuel tax revenues

decline 6%. If VMT remains flat, fuel tax revenue could decline over 40%.





## If fuel consumption continues as the basis of highway funding, one option is to increase the fuel tax rate

One option to address declining fuel tax revenues is to periodically increase the fuel tax. The rate of increase depends on the level of funding required.

- If the objective is to keep revenue per mile driven flat, then the fuel tax rate increase would need to be about 1 cent per gallon every other year.
- If the objective is to match historical increases in highway funding (3.4% per year), then the increase would need to be about 2 cents per gallon every year.
- The result is an increase anywhere from 10 to 50 cents per gallon over the 25-year time period through 2040.

It is important to note that the fuel tax trends experienced at the same level will be mirrored at the county level. Depending on the level of need, counties would need to increase fuel taxes along similar lines as the state.

Note: Other options include raising other fees on road users, including registration fees, weight taxes, and car rental surcharges. However, the focus of this feasibility study is on the comparison of the fuel taxes and a per-mile fee.



#### Raising fuel taxes leads to increasingly inequitable responsibility for road funding among Hawaii's residents

Although raising the fuel tax regularly may provide aggregate revenues to meet statewide road funding needs, it may lead to growing unfairness in road funding. As the chart below shows, at 17 cents per gallon fuel tax (the rate in 2015), a pickup truck would pay about \$90 in state fuel taxes to drive 10,000 miles. A hybrid vehicle would pay one-third that amount, and an electric car would pay nothing. If the fuel tax were to double, the gap would likewise grow, with the pickup paying \$180, about \$120 more than the hybrid vehicle, and the electric vehicle still paying nothing.



Road use fees per 10,000 miles driven



## Per-mile fees have the potential to restore both the reliability and fairness of highway funding

Unlike the fuel tax, a per-mile fee does not suffer revenue erosion due as vehicle fuel economy improves. The revenue per mile driven is a function of the per-mile rate as set by the Legislature. Periodic rate increases may be needed to address cost inflation, but notwithstanding that, the per-mile rate generates revenues that increase as VMT grows and decline as VMT falls. Therefore, revenues track usage. In addition, a per-mile fee restores the principle of user-pay in proportion to the amount of road use consumed. As shown below, each vehicle would pay the same amount under a 1 cent per mile fee (\$100 for 10,000 miles driven). This is in contrast to the variable amounts paid under a fuel tax.





#### There is potential concern over whether this policy would impact adoption rates of clean vehicles



The chart above left illustrates the cost of driving 1,000 miles under a gas tax system, separating the state gas tax (assumed at 16 cents per gallon) from the remaining cost of fuel (assumed at \$2.50 per gallon for gas, and 27.7 cents per kWh for electricity). Putting aside the role of vehicle purchase price in incenting adoption of fuel efficient and electric vehicles, the cost of fuel consumption is a clear financial incentive for

The chart below left illustrates the same concept - cost to drive 1,000 miles - under a per-mile fee of 1 cent. Although all three vehicle types of vehicles do not pay equally in fees to fund the road system, the overall combined cost of fuel and road fees retains an incentive for purchasing fuel-efficient

# Per-mile fees are likely to be costlier for the state to administer than fuel taxes

Hawaii Department of Taxation collects the state and county fuel taxes from distributors and deposits funds by statute into several funds, primarily the state and county highway trust funds. The Department of Taxation does not report the cost of fuel tax collection as a distinct activity, nor does it assess any collection fees on the fund recipients at other state or county agencies. Given the relatively small number of taxpayers (about 50), the cost of collection is likely very small. The average among the other 49 states is about 0.9% of revenues. Given the relatively small amount of revenues collected in Hawaii fuel tax, it is possible the number is slightly larger for Hawaii, but about 1% is a reasonable assumption for cost of fuel tax collection.

By contrast, a per-mile fee would require collecting funds from 1 million or more individual motorists. It is highly likely, therefore, that the per-mile fee will be costlier to collect than fuel taxes. Below are costs associated with per-mile fee systems (largely on heavy vehicles) that are operational.

Per-Mile Fee System	Revenue	Cost to Collect	Cost as a % of Revenue
New Zealand RUC	US \$780 million	US \$16 million	2.0%
Oregon Weight-Mile Tax	US \$308 million	US \$14 million	4.5%
Swiss Heavy Vehicle RUC	US \$170 million	US \$21.6 million	12.7%

In addition, Oregon and Washington State have analyzed the long-term operational costs associated with a per-mile fee on light vehicles, with costs in the 5-15% range depending on policy decisions about account management and operational characteristics.





### Three major categories of collection costs are mileage reporting, transaction processing, and enforcement

In order to determine the potential cost of implementing a per-mile fee in Hawaii, it is useful to begin by deconstructing the concept into three distinct operational aspects: mileage reporting, transaction processing, and enforcement.

- Mileage reporting involves either motorists reporting their mileage driven, or an account manager detecting the number of miles driven by vehicles. There is a range of concepts for mileage reporting as discussed in Section 3. These include providing the odometer reading at annual safety inspections, smartphone images of the odometer, and automated reporting via in-vehicle devices or built-in telematics.
- Transaction processing involves converting the mileage report to an invoice indicating fees owed based on the mileage traveled, and collection of the fee from the motorist. Invoices would be created electronically, but there are many options for processing the payment transaction from the motorist, including in-person, over the phone, and over the internet. In addition, motorists could pay using cash, checks or credit cards. There are also options regarding the entity handling the transaction; it could be the county DMV, safety inspectors, another state agency, outside account managers, or some combination of these.
- Enforcement is required to ensure that as many motorists as possible complete their obligation to pay the per-mile fee. In most revenue collection systems, enforcement can be designed to be revenue neutral or even positive, because late fees, penalties, and interest often exceed the cost of performing the enforcement. For this reason, and for purposes of this high-level study, we will not explicitly treat enforcement costs at this time.



#### Hawaii's current processes for vehicle inspection and registration could provide a cost advantage relative to other jurisdictions in administering a per-mile fee

Cost Category	Alternatives	Costs	
Mileage reporting	Report mileage as part of vehicle safety inspection	Zero marginal cost as this is already required every year for vehicles older than 2 years	
	Report mileage using a mobile app and image of the odometer	Less than \$2 per report	
	Report mileage using OBD-II plug-in device	About \$50 per year (hardware and software)	
	Report mileage using in-vehicle telematics	About \$50 per year, but declining substantially with volume	
	Credit card transactions	Flat fee plus a percentage	
Transaction processing	Cash and check transactions	Cost to handle and process; returned check costs	
	All transactions: customer service, system operations	Costs associated with maintaining IT, providing customer support, accounting	

## Ultimately, the cost of administration depends on policy and operational choices

Policy choices and operational decisions ultimately will govern the overall cost of collecting a per-mile fee. Below is a partial list of some of the key questions that influence cost of collection:

- The per-mile rate determines the amount of the transactions, which in turn determines the fees associated with credit card transactions.
- Definition of subject vehicles determines the total number of customers, which in turn determines the total number of transactions and the extent to which economies of scale are present.
- Mileage reporting method(s) determines the approaches and therefore costs associated with mileage reporting.
- Frequency of mileage reporting and transactions allowed will govern the number and methods of mileage reports, as well as the frequency of customer support, invoicing, and account management services required.
- Establishment of account mangers determines who will be produces invoices and processes transactions, where, and how, all of which can impact costs





# Based on several scenarios combining various possible policy and operational approaches, costs of collection for a per-mile fee in Hawaii could range from 5-13%

Below are descriptions of three scenarios, the corresponding high-level estimated cost range to collect a per-mile fee, net revenue, and cost as a percent of revenue. Under all scenarios, we assumed a per-mile fee of 1 cent per mile assessed on 1.1 million passenger vehicles who travel an average of 8,000 miles per year, leading to gross revenue of \$90 million, based on 2015 figures. These cost assumptions are for a large-scale, "steady-state" system that has one or more mileage reporting options and a single "account manager," either a state agency or a private firm acting on behalf of the state. *Development and setup costs are excluded from these estimates.* 

Scenario Description	Annual Ops Cost (\$ millions)	Net Revenue (\$ millions)	Cost as a % of Revenue
1. Report mileage at annual inspection, make payments annually or via quarterly installments to account manager	5-7	83-85	5-8%
2. Report mileage and pay at annual inspection, or report via smartphone app and pay quarterly to account manager	6-8	82-84	7-9%



3. Same as option 2, but option to pay	10-12	78-80	11-13%
and report quarterly using telematics			



# One policy concern is a perception that per-mile fees will impact rural motorists disproportionately; however, Hawaii fleet analysis suggests the opposite

The table below shows average MPG by rural and urban areas of Hawaii, both at the state level and by county. This demonstrates that motorists who reside in rural areas tend to own, on average, less fuel-efficient cars. Therefore, they currently pay more per mile driven in fuel taxes than their urban counterparts. Under a per-mile fee, this disparity would be corrected.

Region	Average MPG of Cars Registered in Rural Areas	Average MPG of Cars Registered in Urban Areas
Statewide	21.59	22.94
City & County of Honolulu	22.36	22.97
Hawaii County	21.50	22.94
Kauai County	21.28	23.44
Maui County	21.75	22.65



### Geographic analysis reveals consistently higher MPG in urban ZIP codes and lower MPG in rural ZIP codes



The map at left illustrates average combined EPArated MPG by ZIP code tabulation area across Hawaii. The highest MPG ZIP codes are found in the south and east shores of Oahu as well as the Kahului area and other central areas of Maui. Meanwhile, rural areas including the North shore of Oahu, most of Kauai, Hawaii, Molokai and Lanai, have lower MPGs. This result illustrates that residents of more rural areas tend to consume more fuel, and thus pay more state, county, and federal fuel taxes, per mile driven on average than drivers who live in urban areas. The chart below right illustrates the consistency of the trend for city



MPG, highway MPG, and combined MPG to be higher in urban areas than rural areas across all four counties of the state.





## Though costlier to collect than fuel taxes, per-mile fees outperform fuel taxes along the dimensions of revenue sustainability and fairness

Financial Feasibility Factor	Fuel Tax	Per-Mile Fee
Revenue reliability and sustainability	In the short term, fuel tax is stagnant; in the near-term, it will decline. Its reliability is declining and it is not sustainable unless the rate is increased regularly.	Revenues rise and fall with VMT, which is a reflection of system costs, thus revenues are both reliable and sustainable
Fairness by vehicle type	As fleet MPG improves, older and less efficient vehicles bear more and more of the cost of road maintenance	"Equals are treating equally," meaning all vehicles pay the same per mile
Fairness by residence location*	Hawaii residents who live far from urban and employment centers tend to drive less fuel efficient cars, thus they must drive further and pay more per mile in fuel taxes	Motorists who travel longer distances will pay more overall than those who travel shorter distances, but the disparity will be an improvement over fuel taxes.
Cost of collection	Among the most efficient taxes to collect	Costly to collect, especially in the short term, but based on Hawaii's built-in administrative advantages, comparable to other utilities.


### Section 9: Public Acceptance Factors for Road Use Charge in Hawaii

### Polls and surveys measure initial public reaction; focus groups provide insight into the basis for those opinions.

Since this current Mileage-based User Fee Feasibility Study does not involve the collection of original public opinion data and information in Hawaii, this Work Stream relies on existing information derived from public polls, surveys, focus groups and academic research. Each of these sources has attributes and limitations for gauging likely public acceptance factors.

**Public polling**: polls and surveys are usually conducted by phone or online for a short duration (generally between 5 and 20 minutes). They require participants to select their response to a specific question from among a limited range of answers (such as "strongly agree; somewhat agree; somewhat disagree; strongly disagree."). Polls and surveys represent an instant reaction to concepts or specific questions posed, usually without supplemental information, discussion or the introduction of intervening facts. Therefore, participants are more likely to make assumptions or rely on their pre-existing notions to form the basis for their opinion, and their responses are bounded by the multiple choice-style answers.

**Focus groups**: these are gatherings of a small group of participants, often conducted in-person in a meeting room with the assistance of a professional facilitator. The facilitator typically follows a script designed to elicit opinions and discussion, with the ensuing dialogue among participants being recorded for later analysis. As topics are discussed, more information can be learned from participants about their underlying beliefs and reasoning. The facilitator can add additional facts or complexities to the discussion, which helps uncover latent concerns and motivations. Focus groups are capable of revealing how public opinions can shift or change with the introduction of new information.



## Public opinion on per-mile fees reveals a lack of knowledge about transportation taxation – and per-mile fees specifically.

**Current gas tax system is poorly understood**: As state and national public opinion research has shown, there is a widespread lack of knowledge about even the most basic facts related to current transportation taxes, such as how much drivers pay in current gas taxes; that the gas tax rate does not change with the cost of gasoline; how transportation revenues are spent, etc. Flawed public understanding of the current transportation funding system presents a challenge to public officials, especially when asking the public to consider fundamental changes to that system.

Lack of information about mileage-based fees leaves a void, most often filled by popular media depictions: This problem is compounded by the fact that there is no mileage-based tax system for passenger vehicles that has been fully implemented in any of the states that can be used as a reference point. Without specific information about how a per-mile system might work, the public makes assumptions about what such a system might involve. Their assumptions appear heavily influenced by TV, print and social media reports, which tend to emphasize long-abandoned approaches that a few states tested a decade ago (i.e., mandatory, government-issued GPS "tracking" devices).

**Initial public opinion about per-mile fee systems are influenced by these two factors.** Much of the public opinion research, whether polls, surveys or focus groups, asks whether the public prefers the current gas tax system, to a future per-mile fee system. Comparing the merits of a current system versus a future system is particularly difficult where neither of these alternatives is well understood. Thus, public opinion research – and particularly polls and surveys – are most affected by this lack of knowledge and understanding about transportation taxation.



### Very little research on public attitudes related to transportation funding has been conducted in Hawaii, and even less on per-mile fees.

In searching for recent public opinion research related to transportation funding issues in Hawaii, we did not discover any surveys, polls, or focus groups that addressed the issue of per-mile fees. The only instance of this concept being raised with the public was a very recent legislative town hall meeting held in February 2016 on the topic of transportation funding (*Dollars and Sense*).

Public opinion research conducted in other states and nationally on the topic of mileage based user fees can be useful for anticipating the likely reactions and sentiments that might be encountered in Hawaii. These three sources of public opinion information -- other states, national opinion, and limited data from Hawaii – are used to form a composite of likely public reactions and attitudes toward a per-mile fee. Based on this composite, we then highlight potential issues related to public acceptance, and identify conditions and factors that might affect public sentiment related to RUC.





#### Opinion research on per-mile fees in several states reveals similar issues and levels of public support among states

Several other states have conducted RUC public opinion surveys on the topic of per-mile fees. The most relevant information from these states was analyzed with pertinent takeaways summarized below.

State/Data Sources/Year	Initial Public Approval of RUC	Most Common Concerns	Possible Acceptance Factors						
California: Road Charge Focus Groups (DHM Research, 2015)	[Focus groups – no support % provided]	"Fairness" was most common concern	With additional information provided, acceptance shifted – participants viewed RUC as a fair replacement for gas tax						
California: Field Poll No. 2502 (Field Research, 2015)	30% Support	66% oppose "installation of an electronic device in your vehicle"	Support for increased spending on roads (71%), but no majority support for increasing gas tax (49%), expanding tolling (38%) or per-mile tax using electronic mileage meter devices (30%).						



State/Data Sources/Year	Initial Public Approval of RUC	Most Common Concerns	Possible Acceptance Factors					
California: "Green" Transportation Taxes and Fees: Survey of Californians (Mineta Transportation Institute, 2009)	<ul> <li>28% Support for flat- rate (1 cent per mile) fee</li> <li>50% Support for per- mile fee that varies based on vehicle pollution</li> </ul>	Telephone survey; concerns not measured.	<ul> <li>22% increase in public support if the rate varies based on vehicle pollution factors</li> <li>RUC concept presented was pay at the pump</li> <li>Least supportive: those doubting state has transportation problem.</li> </ul>					
Massachusetts: Statewide Poll of 1,506 Registered Voters (MassInc Polling Group, 2013)	<ul> <li>18% would support per-mile tax collected during annual safety inspection</li> <li>61% support gas tax if dedicated to roads and highways</li> <li>50% support toll increases</li> </ul>	Per-mile fee would penalize driving Per-mile fee would discourage economic activity Per-mile fee raises privacy concerns	Only 47% of respondents believe transportation should be funded as a "user pays" system					



State/Data Sources/Year	Initial Public Approval of RUC	Most Common Concerns	Possible Acceptance Factors
Minnesota: Mileage-Based User Fee Policy Study: Supporting Technical Information (Minnesota DOT, 2012)	One a 1 to 10 scale, survey participants were in the neutral range on approval of a per-mile fee system	Concerns that RUC would be used for social engineering (time of day pricing, etc.) Impression and concern that RUC would unfairly tax rural drivers Concerns about government intrusion, location tracking, and data security	Strong sense that gas tax system is inequitable, not all users pay their fair share. Support increases if heavy, polluting vehicles pay more Curiosity over whether RUC would replace or supplement current gas tax system Drivers want full transparency in RUC system and their privacy protected
North Carolina: Decision Maker Poll (Civitas Institute, 2009)	21% favorable view of per-mile fee; 70% unfavorable	No further information.	Legislative Commission had recommended VMT fee be levied in addition to existing gas tax.



State/Data Sources/Year	Initial Public Approval of RUC	Most Common Concerns	Possible Acceptance Factors
Oregon: Road Usage Charge in Oregon: Focus Group Report (DHM Research, 2013)	<ul> <li>30 out of 45 focus</li> <li>group participants</li> <li>supported RUC</li> <li>Same number</li> <li>supported gas tax</li> <li>increase and tolls</li> <li>38 out of 45</li> <li>supported increased</li> <li>vehicle registration</li> <li>fees</li> </ul>	Strongest concern/opposition from those who drive high number of miles Belief that a RUC would "penalize" drivers of high-MPG and clean vehicles, removing incentive to buy those cars	Most all participants felt that all drivers should pay for the roadway they use (user fee) Participants had difficulty understanding the similarities between RUC and gas tax
Texas: Public Acceptability of Vehicle Mileage Fees: Texas Focus Group Results (TTI, 2011)	Focus groups in 5 communities. Initial opposition to concept of a mileage fee	Belief that a mileage fee would force drivers to take fewer trips Administrative costs and complexities Unfair to those who must drive many miles	Basic information about transportation funding system is needed



State/Data	Initial Public	Most Common	Possible Acceptance
Sources/Year	Approval of RUC	Concerns	Factors
Washington: 2014 Statewide VOWS Transportation Survey: Report on Findings (EMC Market and Opinion Research Services, 2015)	Initial support: 35% say RUC is a good way to fund transportation; 57% say RUC is not. Support increases to 42% after respondents are provided more information.	Potential unfairness in how RUC is applied, and difficulty managing RUC are strongest reasons for opposition.	Fairness issues (user pays principal) are most common reason for supporting RUC Providing two sentences of additional information improved acceptability by 7%.



#### A recent report commissioned by TRB provides the most comprehensive review of national public opinion and acceptance factors for RUC

NCHRP Report 487, *Public Perception of Mileage-Based User Fees*, is a comprehensive scan, synthesis and analysis of public opinion in the United States regarding per-mile fees. The report is based on both state-level and multistate (or national) data gathered from 38 public opinion surveys, 10 focus groups and 359 media stories over five years (2010 – 2014).

#### Top level findings from national public opinion research:

- On average, only 24% of the public supports a per-mile fee system for transportation funding. Poll results ranged from 8% to 50% support.
- On average, only 23% of the public supports replacing the existing gas tax with a per-mile fee. Poll results ranged from 8% to 42%. This basic finding was verified in focus groups, where the participants were similarly unaware or not persuaded of the need to change tax methods.
- Personal privacy protection and underlying fairness of the tax system are the two most prominent factors affecting support for per-mile fee systems.
- Administration of a per-mile fee system was a persistent concern. This extended both to mistrust of the technology and to skepticism about government's ability to effectively implement and manage a new per-mile fee system.
- Support for per-mile fees may increase over time with greater exposure to pilot programs and familiarization with the concept. Participants in pilot programs showed higher levels of support. In addition, media content analysis showed that the percentage of stories taking a positive tone gradually increased from 2010 to 2014.



## Hawaii public attitudes toward per-mile fees are likely similar to other states, but more research is needed to probe potential variations.

Very little information about Hawaii residents' opinions on transportation taxation was found. The two sources summarized below did not survey public opinion about mileage-based fees, and only addressed transportation topics within the broader context of public affairs issues. Relevant opinion results are summarized below.

#### 1. Hawaii 2050 Public Opinion Polls, conducted for Hawaii 2050 Sustainability Plan<sup>12</sup>

The purpose of these two public opinion polls was to gauge the attitudes of Hawaii residents towards sustainability. The polls were conducted by telephone, surveying a random sampling of 2,026 residents, evenly distributed by county (500 respondents in each county).

- 55% would agree with government restricting use of the roads in order reduce traffic congestion; 26% disagree.
- 51.4% would agree with *paying higher tolls or taxes* in order to reduce traffic congestion;
   28.2% disagree.
- 36.3% feel that government will be effective in solving Hawaii's problems in the future;
   38.9% disagree; 24.8% are neutral.
- 12.6% think state and local government and spending should grow faster than the rest of the economy; 24.4% think it should grow slower; and 64.1% think it should remain the same.



# Hawaii public attitudes toward per-mile fees are likely similar to other states, but additional original research is needed to probe variations (continued)...

#### 2. Hawaii Poll, January 2015, conducted by Ward Research, Inc.

The Hawaii Poll is a periodic survey on issues of public concern. The Hawaii Poll is commissioned by the Honolulu Star-Advertiser, and conducted by Ward Research Inc. The only question potentially relevant to mileage-based fees (or the transportation system generally) was:

"What do you say is the most important issue facing O'ahu?"

- ▶ 19% said *Rail* was the most important issue
- ▶ 17% said *Traffic*
- ▶ 15% said *Homelessness*
- ▶ 14% said *Economy*
- ► 4% said *Education/Public Schools*
- ► 3% said Crime/Safety
- ► 3% said Affordable Housing
- ▶ 2% said Too Many People
- ► 2% said Overdevelopment
- ▶ 2% said Better Paying Jobs
- > 2% said Potholes/Road Conditions



### Hawaii has several unique characteristics that may distinguish residents' public attitudes from those found in other states

Hawaii has several unique aspects that could lead to different public opinions about the future of the state's transportation tax system than is voiced in other state or national opinions. Factors that may affect public opinion in Hawaii about a potential per-mile fee system include:

- ► Relatively large percentage of rental cars in the state's vehicle fleet
- Relatively large percentage of vehicle miles traveled by non-residents
- Lack of interstate travel by vehicle
- Gas tax rates that vary by county
- Vehicle travel between counties is infrequent
- Annual safety inspections already collect mileage data for passenger vehicles
- ▶ Use of private sector firms to record mileage data and collect fees
- Relatively high consumer adoption rates of clean energy technologies, including solar panels and electric drive vehicles.
- Relatively lower number of per capita annual miles driven by residents



#### Based on composite public opinion information and conditions unique to Hawaii, potential public acceptance issues and factors are highlighted

The table below is an initial list (or hypothesis) of **issues** that may influence public opinion for permile fees in Hawaii, and **factors** that could affect public acceptance of a RUC system in the future.

Issue potentially influencing public acceptability	Dimensions of the issue (sub-issues)	Possible acceptance factors: what might affect this issue?
Low understanding of the revenue problem	How Hawaii's current funding system works Impact of diminishing gas tax revenues per mile driven Why not just raise the gas tax?	Public information initiatives explaining the revenue problem resulting from gas tax reliance Increased media coverage of roadway funding needs and vulnerability of the existing gas tax
Concerns about personal privacy	"Tracking" of drivers' location and times of travel Requirement to report odometer mileage to government How information is used and protected	Lack of interstate travel negates potential benefit of using GPS technology to record out- of-state miles driven Rely on existing, familiar mileage reporting systems in Hawaii (annual safety inspection process) Allow drivers to completely opt-out of mileage reporting by buying an all-you-can-drive permit



Issue potentially influencing public acceptability	Dimensions of the issue (sub-issues)	Possible acceptance factors: what might affect this issue?
Fairness of per- mile fees	Impact on those who must drive long distances (rural residents, commuters) Impact on lower-income drivers Tax cheats might evade payment Ensuring non-residents pay their fair share (rental cars)	Comparative analysis of impacts of RUC vs. existing gas tax system on rural residents, high-mileage drivers, and low-income households in Hawaii Rely on existing vehicle registration enforcement mechanisms for RUC tax compliance Retain gas tax as a "pre-payment" mechanism for RUC; credit against a driver's RUC bill
Impeding environmental policy goals	Requiring fuel-efficient vehicles to pay per-mile fee "penalizes" them Allowing low-MPG vehicles to pay same per-mile fee as all other vehicles removes the incentive to buy fuel-efficient vehicles	Conduct vehicle operating cost analysis of different vehicle types, with RUC vs. gas tax Design the vehicle tax system (RUC rates, registration fees, vehicle sales taxes, rebates, etc.) to provide discount for fuel-efficient vehicles or surcharge for low-MPG vehicles.



Issue potentially influencing public acceptability	Dimensions of the issue (sub-issues)	Possible acceptance factors: what might affect this issue?
Administrative costs and effectiveness	Cost to administer a new RUC program Accuracy of mileage reporting methods (technology and self- reported) Charging drivers the proper mileage rates (if varied by county)	Reliance on existing mileage reporting mechanisms in Hawaii (safety inspection process) should significantly reduce administrative costs Safety inspection process is a low-cost mileage verification method
Household financial impacts	Large lump-sum tax payment owed instead of frequent but small gas tax payments Per-mile fee in addition to gas tax is "double-taxation" and too much of a tax burden	Retain existing gas tax as a pre-payment method to be credited against RUC bill Allow payments to be made quarterly or monthly instead of annually at time of vehicle registration



Issue potentially influencing public acceptability	Dimensions of the issue (sub-issues)	Possible acceptance factors: what might affect this issue?
Confusion about use of per-miles fees	Per-mile fees will be used for Honolulu rail project Potential for diversion to general government programs and purposes	Require revenue to be placed in Hawaii's state highway trust fund Require county-level fees to similarly be used solely for roadway purposes



#### Additional public opinion research specific to Hawaii is needed

As additional information is learned about public attitudes toward transportation and taxation in Hawaii, new issues should be added to this list. If HDOT proceeds with investigation of a per-mile fee system in Hawaii, a future work task should include commissioning public opinion research in Hawaii on the topic of a per-mile fee system. While we expect most public sentiments will be similar to those expressed in other states and nationally, Hawaii has several characteristics that could raise different concerns. By the same token, Hawaii residents likely have less concern over these common issues raised in other states:

- ▶ How to ensure out-of-state drivers who cross over to drive in Hawaii pay per-mile fees
- How to ensure Hawaii drivers don't get charged for miles driven in neighboring states
- ► How to integrate a per-mile fee system and policy with existing tolling policy and systems
- Administrative costs associated with manual odometer readings by state agencies



# Public acceptance improves – in some cases, to majority support -- with greater issue understanding, familiarity and exposure to per-mile fee systems

It's important to distinguish public acceptance factors from public support. *Public support* means the percentage of people who favor per-mile fees as a potential solution to the transportation-funding problem. In contrast, *public acceptance* recognizes that even if people don't actively support a per mile fee, their level of opposition can be less intense, suggesting that they might tolerate a per-mile fee so long as their strongest concerns are mitigated or resolved.

An example of this difference is illustrated with recent state gas tax increases around the nation. In many cases, public support for state gas tax increases was below 50%. In spite of the lack of majority public support, elected officials found that general public *acceptance* was sufficient to provide them confidence to increase the gas tax, and that doing so would not trigger intense opposition and voter backlash.

*Public acceptance factors* are those conditions capable of swaying public opinion in a direction either more favorable or opposed. Findings from research in Oregon, California, Washington and nationally show that public support increases significantly when additional facts are provided. Even more impactful for per-mile fee system prospects, those who participate in pilot or demonstration projects shift their opinions significantly – to large majority support (70%) in some cases.



### Appendix: Project Work Plan Description



#### Work streams were sequenced to meet key project milestones

In order to present study results in the required 2016 timeframe, the project team conducted work streams in parallel, recognizing the interdependencies among some work streams and threshold decisions that must be made by HDOT officials. To meet the dual imperatives of fact-based decision-making and final report by June 2016, the project team worked toward the schedule shown below. The milestone deliverables indicated in the bottom row of the schedule are detailed in each of the following six pages.

Month	Janu	uary		Febr	uary			March				April				May				June				
Week	18-Jan	25-Jan	1-Feb	8-Feb	15-Feb	22-Feb	29-Feb	7-Mar	14-Mar	21-Mar	28-Mar	4-Apr	11-Apr	18-Apr	25-Apr	2-May	9-May	16-May	23-May	30-May	6-Jun	13-Jun	20-Jun	27-Jun
WS 1 - Financial Analysis																								
WS 2 - Operational Approaches																								
WS 3 - Acceptance Factors																								
WS 4 - Policy Issues																								
Deliverables		*				*			*		*		*											



- Activities
  - > Prepared and presented per-mile charge background materials
  - > Convened kickoff meeting with project sponsor and stakeholders January 19-22, 2016
  - > Defined project objectives in workshop format
  - > Conducted background research and project-related data gathering in follow-on meetings
  - > Identified policy issues that may affect feasibility of a per-mile charge in Hawaii
  - > Finalized the Project Work Plan
- Deliverables
  - > Kickoff meeting and objectives workshop agenda and notes
  - > Per-mile charge overview and background presentation
  - > Final Project Work Plan
- Completion date: January 29, 2016





#### **Milestone #2: Policy issues and operational concepts**

- Activities
  - > Addressed policy issues identified in kick-off meeting that affect feasibility of a per-mile charge in Hawaii
  - > Outlined mileage reporting methods and concepts for Hawaii
  - > Prepared and presented materials at meetings in Honolulu the week of February 15
- Deliverables
  - > Briefing materials on policy issues
  - > Briefing materials on mileage-reporting methods, technologies and operational concepts
- Completion date: February 26, 2016





#### **Milestone #3: Financial analysis**

- Activities
  - > Researched and analyzed financial dimensions in Hawaii of existing transportation revenue sources and potential future per-mile charge
  - > Selected and analyzed preferred mileage reporting methods to be captured in financial analysis
  - Identified and analyzed finance-related potential policy parameters for mileage charge in Hawaii such as per-mile rate(s) and comparisons with existing revenue sources
  - > Presented financial analysis at meetings in Honolulu the week of March 21, 2016
- Deliverables
  - > Financial analysis briefing materials
  - > Financial analysis presentation
- Completion date: March 23, 2016



### Milestone #4: Public acceptance factors and preliminary feasibility determination

- Activities
  - > Prepared report and presentation on public acceptance factors regarding a per-mile charge in Hawaii
  - > Prepared and presented materials to facilitate HDOT discussion of feasibility determination for per-mile charges in Hawaii
  - > Outlined dimensions of a possible grant application for federal funding
  - > Jointly develop outline of final report during week of March 21, 2016
- Deliverables
  - > Public acceptance factors briefing materials and presentation
  - > Presentation materials on mileage charge feasibility
  - > Final report outline
- ► Completion date: March 31, 2016





#### **Milestone #5: Draft final report**

- Activities
  - > Developed Draft Final Report
  - > Discussed final feasibility determination and recommendations
- Deliverable
  - > Draft Final Report
- Completion date: April 21, 2016





#### **Milestone #6: Final report and presentation**

- Activities
  - > Briefing for Hawaii DOT executives and other public officials
  - > Present findings and recommendations to Hawaii Legislature
  - > Determine next steps and support for Hawaii DOT
- Deliverables
  - > Final Report
  - > Presentations to Hawaii DOT and Legislature
  - > Technical memo outlining potential next steps for Hawaii DOT
- Estimated completion date: June 30, 2016





### **Endnotes**

1 HB 1286, enacted as Act 038 of 2015. https://legiscan.com/HI/text/HB1286/id/1098459

2 See page 87 of this report, showing that even under an increasing VMT scenario where total mileage increases 2% each year, Hawaii's fuel tax revenue will decline over the next 25 years. For similar national level trends, see *Impact of Fuel Use Trends on the Highway Trust Fund's Present and Future*, D.Braun, R.Endorf, S.Parker, College of William & Mary, January, 2013.

3 "Gas prices tend to have little effect on demand for car travel", *Today in Energy*, Energy Information Administration, U.S. Department of Energy, December 15, 2014. Accessed at: https://www.eia.gov/todayinenergy/detail.cfm?id=19191

4 According to the American Automobile Association, the average retail price of gasoline in Hawaii was \$2.63 cents as of February 4, 2016. See: www.fuelgaugereport.aaa.com 5 *Ibid.* 

6 For examples of these sentiments, see: "Three states considering taxing electric cars to compensate for lost gas taxes," *Autoblog*, March 24, 2011; "States consider taxing electric cars to make up for lost gas tax revenue," *Plugincars.com*, 2011; "Taxing EVs: no gas tax means no gas tax," *Charged* Electric Vehicle Magazine, July 11, 2013. 7 A "feebate" is a tax or fee system that charges vehicles with poor energy or environmental performance a higher rate, with the proceeds used to provide drivers with financial incentives to encourage adoption and use of energy-efficient and/or cleaner vehicles. The word is a combination of "fee" and "rebate."

8 *C.f., "An Evaluation of National Road User Charging in England,*" Stephen Glaister, Transportation Research Part A: Policy and Practice, Vol. 39, Issues 7-9, November 2005. 9 In order to provide energy consumption estimates for all vehicles, regardless of fuel source, the U.S. Environmental Protection Agency developed a miles per gallon of gasoline equivalent, or MPGe. This is a measure of average distance traveled per unit of energy consumed. It is used only for alternative fuel vehicles, such as plug-in electrics. Since the graphic in the report is comparing two different types of roadway taxes – fuel tax vs. per-mile fee – MPGe is an irrelevant metric for tax comparison purposes. 10 See: *"Road Usage Charge Assessment: Financial Implications for Urban and Rural Drivers,*" Washington State Transportation Commission, January 2015.

11 Marion, J. and E. Muehlegger. "Fuel tax incidence and supply conditions." Journal of Public Economics, Vol. 95, Iss. 9-10, October 2011.

12 HIPA Report, SMS Research and Marketing Services, Inc. 2007. Conducted for the Hawaii Institute for Public Affairs.