

**Report on Economic
Viability of Road Usage
Charging in Oregon**

June 2013

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Definitions and Abbreviations

In this document, the following definitions and abbreviations are employed.

Term / Abbreviation	Definition/Description	Remarks
CAPEX	Capital expenses (or outlays)	
CE	Certification Entity	
CONOPS	Concept of Operations	
CSP	Certified Service Provider	
DMV	Driver & Motor Vehicle Services Division of ODOT	
GPS	Global Positioning System	
HB	House Bill	House Bill 2453 in the 2013 Oregon legislative session relates to RUC
ITS	Intelligent Transportation Systems	
M2M	machine-to-machine	
MRD	Mileage Reporting Device	This is the ODOT definition of what is commonly referred in the road pricing industry as an OBU (On Board Unit)
ODOT	Oregon Department of Transportation	
OPEX	Operational expenses	
ROI	Return On Investment	
RUC	Road usage charging	
RUCAS	Road usage charge accounting system	
RUFTF	Road User Fee Task Force	
RUCPP	Road Usage Charge Pilot Project	
SEIU	Service Employees International Union	ODOT Union

Introduction

The purpose of this report is to assess the economic viability of Oregon's proposed road usage charge concept. The concept is based on policies endorsed by the Road User Fee Task Force (RUFTF) and embodied by House Bill (HB) 2453, a piece of legislation currently under consideration by the Oregon Legislature. Based on our research and analyses of economic viability, as presented in this document, we believe that the RUC policy and concepts, as currently formulated in Oregon, will be economically viable from the perspective of all salient stakeholders on July 1, 2015, and increasingly so as the program grows beyond that.

Over the past decade, as RUFTF and the Oregon Department of Transportation (ODOT) have explored alternative approaches to assessing road usage charges, one of the key guiding principles has been to formulate solutions that minimize costs to the state associated with administering the new system. Costs, however, must be balanced by other overarching objectives which include the following: begin to address the declining revenues coming in to the state highway trust fund due to improving fuel economy of the Oregon vehicle fleet; provide motorists with choices in how to measure, report, and pay road usage charges that are straightforward (from the public perspective); follow an open systems paradigm that allows for technology evolution; and respect user privacy.

The latest vision for road usage charging, as reflected in HB 2453, answers these objectives. The bill would implement road usage charges for vehicles rated 55+ miles per gallon (MPG) or miles per gallon equivalent (MPGe) by the U.S. Environmental Protection Agency (EPA) starting in 2015.

Motorists subject to the road usage charge would have choices regarding how to measure, report, and pay it, choosing from a range of both public and private account management alternatives. Oregon's vision is to rely on the private sector to offer market-based solutions for road usage charging, since numerous ventures are already marketing in-vehicle services to motorists, ranging from insurance to telematics to telecommunications. By allowing motorists to pay road usage charges through these third-party entities, ODOT and the State of Oregon can avoid building a costly administration and rely instead on mileage measurement technologies, account management systems, and revenue collection systems already put in place by industry.

This innovative, industry-based, open market approach to road usage charging is not unprecedented. In Oregon, hotels collect state hotel taxes from their guests, while phone companies collect telecommunications taxes from their customers. In transportation, service stations dispensing use fuels such as diesel collect a per-gallon tax directly from motorists. In each case, the tax collector is a private entity that collects taxes from individuals on behalf of the State of Oregon, and then remits taxes due to the State Treasury, less a service fee that ranges from 0-5% depending on the tax. Ireland and New Zealand collect road tolls and distance-based road usage charges, respectively, in a similar manner, relying on certified service providers (CSPs) to collect

revenues.¹

As noted above, the objective of this report is to assess the economic viability of Oregon's proposed approach to road usage charging (RUC). Economic viability is the first step in building an overall programmatic business case, as it measures the likelihood with which the private sector will find the opportunities and conditions of the road usage charge marketplace attractive enough to warrant participation. In this report, we consider a wide range of other stakeholders as well, but the focus is economic viability for ODOT and private RUC service providers.

The following list briefly summarizes the tools used for this economic viability analysis:

- Qualitative tools:
 - **Stakeholder identification and analysis**, based on a stakeholder modeling tool developed by Mitchell, et al.² The purpose of this analysis is to identify the full range of stakeholders and improve our understanding of the ability of each stakeholder to influence the proposed road usage charging system.
 - **Policy matrix**, which identifies the key policy elements of the latest version of HB 2453 (version B) and compares each element with ODOT's proposed Concept of Operations (CONOPS) for road usage charging, a technical document that was developed in 2011 and revised following testing in 2012-2013 as part of the road usage charge pilot program (RUCPP). This matrix is shown in Appendix C.
- Quantitative tools:
 - **ODOT financial model**, which was a cost- and revenue-estimating tool originally developed and utilized under a preceding work order (WOC 1, Tasks 11 and 12). As part of the economic viability analysis, several key enhancements to the model were made and tested. Results from the model are presented in this document and form the basis of an assessment of the economic viability of RUC from the perspective of ODOT.
 - **Market agent analysis**. While the ODOT financial model focuses on costs of road usage charging borne by ODOT, we also conducted extensive research and outreach to industry in order to understand principal drivers and costs that private sector entities (so-called "market agents") participating in RUC can expect. By understanding these costs, as well as revenue opportunities available to industry through sales of services such as pay-as-you-drive (PAYD) insurance, we can begin to assess the economic viability of RUC from the perspective of private participants in the provision of RUC services.

¹ While many countries contract with private entities to collect tolls and distance-based road usage charges, Ireland and New Zealand do so under open market conditions, as envisioned for Oregon.

² Mitchell, R., Agle, B., and Wood, D. (1997). "Toward a theory of stakeholder salience: defining the principle of who and what really counts," *Academy Of Management Review*, Vol. 22, No. 4, 853-886.

Although this document does not represent a complete business case, it does provide the rudiments of a business case by analyzing the economic positions of key stakeholders as well as the conditions under which RUC is economically viable. Based on the research conducted for this task and the analysis presented in this document, we can conclude that Oregon's road usage charging is economically viable from the perspective of all salient stakeholders, including the following key stakeholders:

- **ODOT.** During the first full biennium of road usage charging in Oregon, as the number of vehicles subject to the new charge approaches and likely exceeds 10,000, ODOT will encounter annual operational costs that are approximately 50% of RUC revenues, leaving net revenues of approximately \$1 million per year. This is economically viable for several reasons:
 1. The net revenues will be derived from highly fuel efficient vehicles that otherwise would be paying very little if any fuel tax into the state highway trust fund.
 2. The RUC system is highly scalable, such that as the number of vehicles in the program grows, ODOT's annual operating costs will decline to approximately 5% of gross revenues. As the number of vehicles in the program approaches 1 million, the operating costs will drop even lower.

Other state stakeholders include the Oregon Legislature and RUFTF. It is presumed that these entities will work closely with ODOT to monitor the economic viability of the RUC program as it matures.

- **Market agents.** The private sector's impetus to provide RUC services may be driven by several reasons.
 - First, RUC is a revenue opportunity due to the likelihood that ODOT will allow collectors to retain a fee. Although ODOT has not decided the particular fee mechanism or amount, precedents from tolling systems and similar tax programs suggest a fee at or below 10% of revenues. Higher volumes of vehicles will further reduce administrative and operational costs as a percentage of revenues.
 - Secondly, RUC is likely to be a marginal-cost addition to a larger platform such as in-vehicle telematics. Marginal costs of RUC implementation would be insignificant and the operational impacts small, making RUC a viable service offering and source of additional revenue even at low vehicle volumes, thus attractive to this market segment.
 - Thirdly, RUC represents one among a range of potential value added services that private providers can market to motorists. Based on the legislative mandate of reporting mileage and payment of the road usage charge, value added services can be layered on top of this mandated requirement to provide additional revenues.

- Fourthly, the RUC CSP model is a transactional market model. Market agents will be attempting to grow market share (% of vehicles subscribing to their services) in order to grow their business and profits. Since Oregon will be the “first mover” to implement RUC, a number of entrepreneurial companies will be interested in investing and competing in Oregon in order to capture as much of the RUC market as early as possible in anticipation of a “domino effect” of other states and provinces following suit to implement RUC policies. The corporate references, operating experience, and unique operational intellectual property will be invaluable assets as other States and jurisdictions follow suit.
- Last, the more conservative and larger “second-in” corporate entities may simply follow the market development, to avoid the risks of the start-up ventures that initially take the lead. These larger and more stable companies may simply wait until market size and profits meet their corporate investment appetite. At that point, these “second-in” companies will either chose to enter the market by acquisition or offer greater capacity, reach into other services and wider area coverage and trusted name brand security to motorists. This second wave of market development will likely be the true mark of a mature system cycle development.

Economic Viability Analysis

Overview

The central purpose of the economic viability analysis is to determine whether Oregon's proposed road usage charging (RUC) concept, based on HB 2453-B, will be "economically viable" for all salient stakeholders. In short, the analysis presented in this report measures the likelihood with which particular stakeholders will find the opportunities and conditions of the RUC concept attractive enough to warrant participation.

Short of a full business case, which provides more detailed quantitative outputs, the economic viability forms the rudiments of a business case and provides direction for the further development and refinement of operational concepts designed to carry out any policies that may be set forth by the Oregon Legislature and/or the Road User Fee Task Force (RUFTF).

This section provides the detailed analyses and outputs derived from this task, which comprised the following three key elements.

- **Stakeholder Identification and Analysis.** The first step included identification and analysis of stakeholder power, urgency and legitimacy at two key points in time: Day One and Mature System. The main goal of this exercise was to agree on the key stakeholders for whom economic viability is important and then determine their relative salience. This process was derived by employing the Mitchell framework for stakeholder analysis, in which both Consultant and ODOT participated in a roundtable discussion and analysis of possible stakeholders that can influence RUC. The results of this process are presented in the pages that follow.
- **Market Agent Analysis.** Successful implementation of RUC depends on active participation and investment by the private sector in order to: (1) reduce costs to ODOT (2) provide user choice for RUC compliance (3), protect privacy, and (4). Improve technology offerings and customer service while reducing technology risk. The key to overall economic viability of RUC is to determine economic viability for the private sector, via analysis of prospective costs and revenues for various market agents (including hardware, communications, data, and service providers). Market agent observations and assumptions were derived from this research, which culminated with several scenarios providing a range of predictions of market agent costs and revenues.
- **Financial Model of ODOT Costs:** In tandem with the research on economic viability for market agents, we conducted an in-depth review of cost estimates for ODOT derived from the financial model, which was developed as part of earlier research. This included a number of model updates and enhancements, refined assumptions, and new scenarios.

Stakeholder Identification and Analysis

Stakeholder Identification

Road usage charging must be viable for all stakeholders involved. However, the definition of and criteria for “economic viability” varies depending on the stakeholder. For example, economic viability for the Oregon Legislature and ODOT means that the net revenues for the State Highway Trust Fund increase with RUC. This means the operating costs must be reasonable, particularly as a proportion of revenues from RUC. On the other hand, for the private sector “market agents,” economic viability means that companies can profit from the provision of services to motorists — services that include RUC as a means to leverage the market and increase market share for other services. For RUC payers, economic viability means that the costs and efforts to comply with RUC do not create an undue burden.

The economic viability analysis covers the following key stakeholders identified and defined in conjunction with ODOT staff:

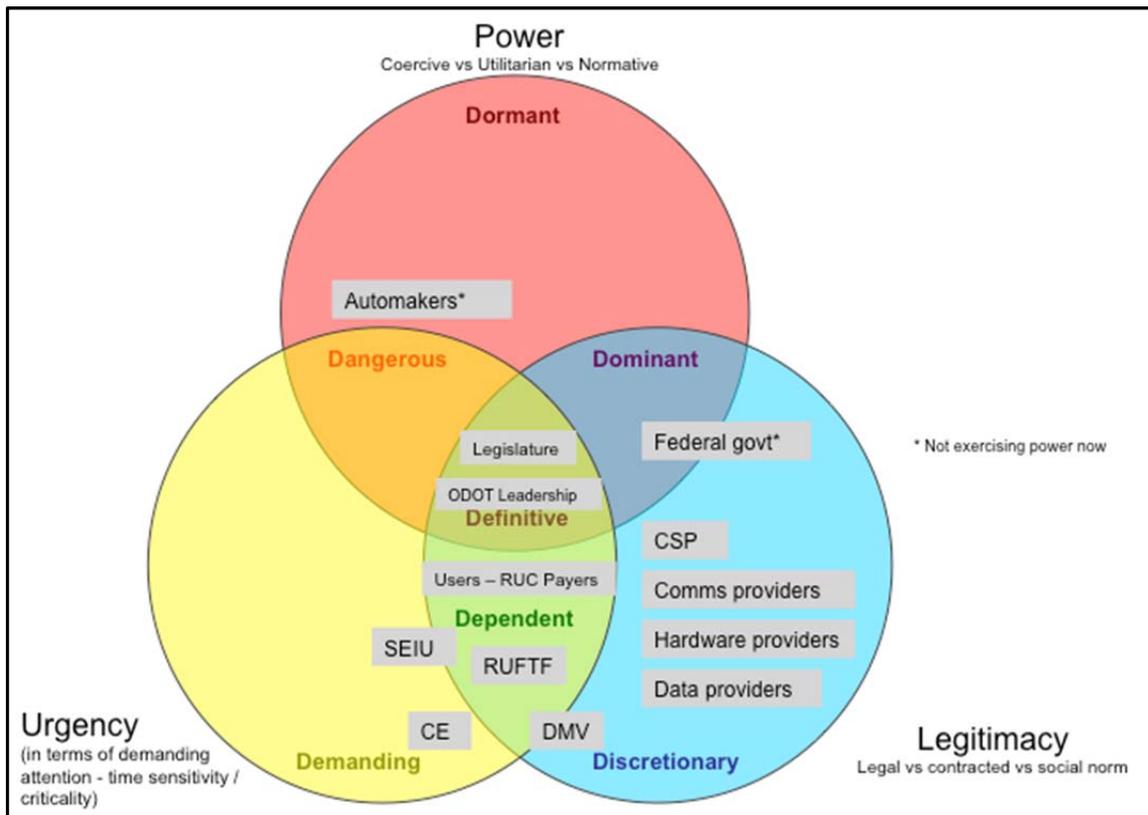
- Oregon Legislature
- Road User Fee Task Force (RUFTF)
- ODOT leadership
- ODOT DMV
- RUC payers
- Market agents (private sector), including the following:
 - Certified Service Providers or CSPs (account managers)
 - Communications providers
 - Hardware providers
 - Data providers
 - Certification entities
- RUC payers
- ODOT Union (Service Employees International Union)
- Automakers
- Federal government
- Other jurisdictions (states)

The following sections summarize the results of an exercise undertaken by the Consultant and ODOT to characterize each stakeholder’s power, legitimacy, and urgency with respect to RUC policy in Oregon at both “day one” of RUC in Oregon and for a “mature system.” This exercise, based on a framework developed by Mitchell, et al., was described in the methodology that preceded this milestone deliverable. The outcome is to improve ODOT’s understanding of each stakeholder’s needs, expectations, and ability to influence the RUC system. The combination of power, urgency, and legitimacy of a stakeholder provides a qualitative understanding of that stakeholder’s overall salience, which in turn helps us to understand the importance of economic viability to each one.

Stakeholder Analysis – Day One

The diagram below illustrates the salience of various stakeholders. This analysis represents the salience of various stakeholders from the perspective of the RUC program within ODOT, as determined by the team of ODOT and its Consultant during a series of meetings to arrive at mutually agreeable placements for each stakeholder. Salience is a simultaneous measure of power, urgency, and legitimacy.

Figure 1: Representation of RUC Stakeholders at Day One



The purpose of this analysis is to understand the types of influences, demands, risks, and challenges facing the RUC entity. By constructing several snapshots at various points in time, we can better anticipate the stakeholder dynamics, thereby informing the design of a system with stronger “viability” from the perspective of the key stakeholders. For example, the threshold for “viability” is higher for a dominant stakeholder than for a discretionary one.

At Day One, the salience of the stakeholders in the RUC ecosystem reflects the relatively small size of the program, early scrutiny by policy makers and management, and uncertain level of participation by private sector entities. The table below summarizes the qualitative description of power, urgency, and legitimacy for each stakeholder.

Table 1: Stakeholder Analysis for RUC at Day One

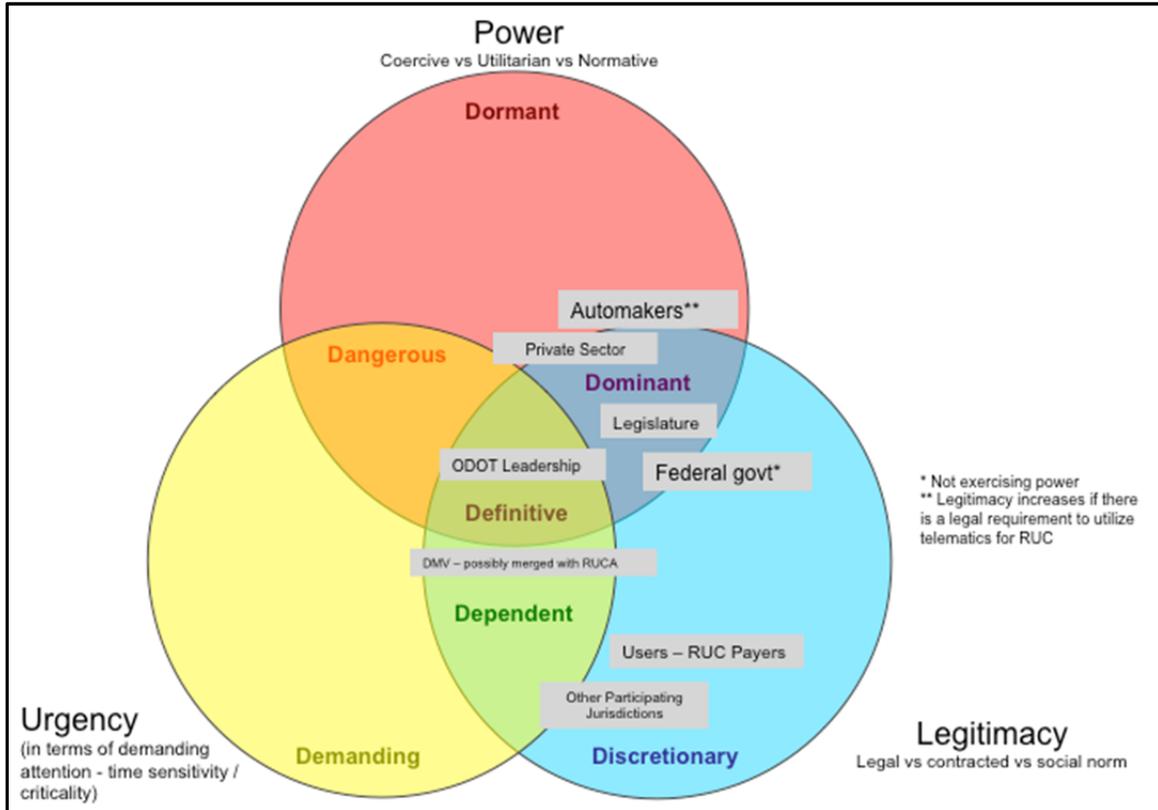
Stakeholder	Power	Urgency	Legitimacy
Legislature	Enables regulation, and taxation by state agencies including ODOT	Stems from the need to address transport revenue erosion and equity in the state	Elected body recognized as the legitimate source of Oregon law
RUFTF	Created by the legislature, power is a function of legislative action	Recognition the transport revenue is nearing a sharp decline	Created and empowered by the legislature
ODOT leadership	Leadership represents the executive authority of the state of Oregon	Transport revenue erosion threatens mission of the organization	Powers derived from the Oregon Constitution and Legislature, with backing by Governor
DMV	Some influence over RUC, but not at the policy level	Any urgency that exists relating to RUC is directed at maintaining the status quo	Derives powers and authority from ODOT leadership and the criticality of maintaining DMV's ongoing mission which involves substantial revenues
RUC payers	Not yet fully aware of RUC policy nor organized to influence it, given small numbers of RUC payers on Day One	RUC payers recognize their requirements to pay RUC and, depending on satisfaction, could feel urgently about need for change	RUC payers as voters are the ultimate source of power in the state
CSPs	CSPs have power to influence the RUC entity, arising from the presumption they can deliver RUC services at costs below what ODOT can achieve	As they don't yet exist, CSPs have no urgency	Given the preference for private sector participation as expressed in legislation, CSPs are legitimate participants
Communications providers	Relative to other private sector entities, comms providers wield substantial power as their networks enable the wireless communications necessary for RUC	Given the relatively low volumes in the early years, telecommunications companies may not have urgency.	Given the desire for automated, electronic reporting and market based solutions for RUC, communications providers are legitimate stakeholders
Hardware providers	Little ability to influence RUC policy and operations directly unless and until directly involved; likely early involvement as joint venture with CSPs	May not be interested in early participation when cost pressures from ODOT are downward, thus limiting revenue opportunities	Legitimacy derived from ability to enable electronic reporting in early phases

Stakeholder	Power	Urgency	Legitimacy
<i>Data providers</i>	<i>Little ability to influence RUC policy and operations directly unless and until directly involved; likely early involvement as joint venture with CSPs</i>	<i>May not be interested in early participation when cost pressures from ODOT are downward, thus limiting revenue opportunities</i>	<i>Legitimacy derived from ability to enable electronic reporting in early phases</i>
Certification entities (CE)	ODOT capable of providing certification in-house, thereby removing leverage of private certification entities	Private certification entities see RUC as an opportunity for growth and may market their services to ODOT	External certification not explicitly required as part of enabling legislation
Union (SEIU)	Once RUC legislation is implemented, it is in their interest, like the RUC entity, to conform with policy requirements	May request administrative rules to benefit the union once legislation is implemented	Unions not mentioned in enabling legislation, but some legitimacy derived from recognition by state agencies
Automakers	Automakers have the power to "open" data sources from vehicles to improve RUC	Without a business case, automakers have no urgency to participate	With respect to policy and operations, there is not yet a legitimate role for automakers in a legal or contractual way, although this will certainly evolve
Federal government	Although vested with considerable powers the federal government has not chosen to exercise it with respect to RUC, nor is there any expectation it will prior to Day One	Since the 2006-2007 road user fee pilot program, the federal government has not played a role in Oregon's RUC development and has not expressed any urgency to do so	Should it decide to act, the federal government has legitimacy to influence RUC in Oregon
Other jurisdictions	At day one, no other jurisdictions have yet committed to RUC; therefore, for the time being, they are non-stakeholders except as participants in any continued pilot testing.		

Stakeholder Analysis – Mature System

In a mature RUC system, the private sector takes on a much more salient role given the widespread adoption of electronic reporting and expansion of the CSP role by market participants. This is likely to include automakers that will provide data from vehicles for RUC purposes. In a mature system, legislative scrutiny is less intense, reflecting a dwindling interest in the policy by users who are accustomed to paying RUC. However, other participating jurisdictions may pressure Oregon with varying degrees of urgency given the likely timing of other jurisdictions following Oregon's lead in this policy area.

Figure 2: Stakeholder Representation for Mature RUC System



The table below summarizes the qualitative description of power, urgency, and legitimacy for each stakeholder in a mature system.

Table 2: Stakeholder Analysis for Mature RUC System

Stakeholder	Power	Urgency	Legitimacy
Legislature	Enables regulation, and taxation by state agencies including ODOT	Urgency only in the event of a controversy or problem with RUC collection	Elected body recognized as the legitimate source of Oregon law
RUFTF	Once policy is set and operations are ongoing, RUFTF no longer necessary and becomes a non-stakeholder.		
ODOT leadership	Leadership represents the executive authority of the state of Oregon	Urgency relates to maintaining and not disrupting the flow of RUC, a principal revenue source	Powers derived from the Oregon Constitution and Legislature, with backing by Governor
DMV	Some influence over RUC, but at the same organizational level, so equally dependent on leadership	Any urgency that exists relating to RUC is directed at maintaining the status quo	Derives powers and authority from ODOT leadership
RUC payers	Not organized to influence RUC as long as policy and operations are transparent and non-controversial	No urgency to change RUC as long as policy and operations are transparent and non-controversial	RUC payers as voters are the ultimate source of power in the state

Stakeholder	Power	Urgency	Legitimacy
Private sector (includes CSPs, communications providers, hardware providers, data providers, and certification entities)	Given the majority of revenues are collected by the private sector, CSPs and their constituent entities (hardware providers, data providers) can exercise a great deal of power over RUC. To the extent there is competition among CSPs, rigorous certification by certification entities, and oversight by ODOT, this power can be checked	Little urgency to change or grow a system in which CSPs already proliferate. Urgency at this stage is related to maintaining market share and exercising competitive tactics to maintain customer base.	Private sector participants only have legitimacy to the extent that it is provided by ODOT through contractual mechanisms
Automakers	Automakers have the power to "open" data sources from vehicles. So long as telematics is the principal source of data for electronic reporting of RUC, this provides power to automakers	Without a business case for substantial revenues or customer retention due to cooperation with RUC entity, automakers have limited urgency to participate	Legitimacy of automakers in the long run is a function of the resolution of the question about data ownership. As long as automakers have a legitimate stake in the ownership and/or provision of vehicle data, they are a legitimate stakeholder
Federal government	It is not likely that the federal government will mandate policy or methodological changes to Oregon's RUC program even in the long term. Like state fuels taxes, RUC will be administered and collected by the state	It is unlikely that the federal government will influence Oregon's RUC with any urgency, especially once the program is mature	The federal government remains a legitimate stakeholder in a mature system
Other jurisdictions	Power of other jurisdictions depends on their ability to influence RUC in Oregon. Given the relatively modest amount of pass-through travel by light vehicles, no jurisdictions can exercise real power over the success of Oregon's program from a revenue standpoint	Urgency to implement RUC and interoperable RUC across state lines will vary based on the level of cross-state interaction of each jurisdiction. For the most part, Oregon neighbors will be most concerned with policy and operations for in-state vehicles given the relatively small amount of cross-border travel by light vehicles in large western states	Other states derive legitimacy from their status as equals in the U.S. federalist system, while foreign jurisdictions derive legitimacy through formal recognition by the U.S. There are likely to be formal, legal mechanisms promoting multi-state cooperation that grant legitimacy to other jurisdictions in the specific area of RUC

Market Agent Analysis

The success of RUC in Oregon depends on a compelling business case for all salient stakeholders, including the Oregon Legislature, ODOT, RUC payers, and private providers of RUC services. The Legislature and ODOT have indicated a desire to leave as much RUC service provision as possible to certified service providers (CSPs) from the private sector. Therefore, the overall business case depends on the ability and willingness of the private sector to deliver acceptable RUC measurement, collection, and administration services in an open system and market paradigm. The purpose of this section is to summarize the elements of the business case for private sector provision of RUC services, with the aim of answering the fundamental question, "under what conditions is RUC economically viable for market agents?" Market agents include

account managers (used interchangeably with CSPs), hardware providers, data providers, and certification entities.

Business Case for RUC as an App

Road usage charging as envisioned in Oregon can be compared to an application (“app”) in the smartphone app marketplace that developed from 2005-present. RUC is just one among many applications, built for use on a common platform. The platform in the case of RUC is in-vehicle telematics. Telematics, whether factory-installed or aftermarket is like a smartphone: a costly development endeavor involving significant investments in hardware and software, marketing, and other deployment costs. Many automakers and related third-party ventures have begun to develop, market, and sell telematics, as they already see a compelling business case. Although the penetration of telematics is relatively modest to date, with about 10% of vehicles equipped, there is a consensus among auto industry observers that telematics services will grow rapidly in the near future, with some analysts predicting as much as 80% penetration by 2017. Among the vehicles anticipated to be subject to RUC, it is likely that more than half will have telematics capabilities. This growth is driven by a combination of factors that include competition among automakers for in-vehicle services, demand from increasingly connected and tech-savvy car buyers, and proactive safety measures to reduce automaker liability.

The telematics market can be described as a three-legged stool, with industry, the government, and the consumer as the legs. If any one of the legs is missing, the stool collapses. RUC provides the justification to bring all three legs into alignment. For government, RUC provides sustainable revenues. For industry, RUC is an “app” that can be used to leverage other products through the telematics platform. For consumers, a RUC app provides a convenient way to comply with policy while simplifying automobile travel and enhancing it with value added services that fit their lifestyles.

Telematics come in a range of flavors, categorized roughly as follows.

- **Aftermarket telematics** are available from a range of relatively small and startup ventures, most of which rely on in-vehicle devices that plug in to the vehicle’s data port, similar to the devices used in the Road Usage Charge Pilot Program (RUCPP).
 - **Usage-based insurance.** Numerous companies have begun to offer these services, typically under contract to large auto insurance providers. Examples include IMS and MetroMile (available in Oregon only).
 - **Other services.** Some pay as your drive (PAYD) insurance providers also provide other services, which range from emergency response to parking location and payment, driving suggestions for improving fuel efficiency, engine diagnostics, young driver monitoring, and communications. An example of a company providing services other than insurance via aftermarket telematics is Automatic.

- **Factory-installed telematics** are available on a range of vehicles, including OnStar by General Motors, Ford’s Sync, and Toyota’s Entune. No two telematics platforms are alike, with some relying more on built-in software and features (e.g., OnStar) and others relying more on connections to external devices such as smartphones and tablets (e.g., Sync). Services include navigation, in-vehicle infotainment, emergency response, and insurance.

The marginal cost of developing an “app” for RUC as part of an existing telematics platform is very low. Likewise, the marginal revenue a private entity would require to justify investing in and establishing a CSP (with existing customers) to develop and deploy a RUC app is modest: <5% of anticipated RUC revenues on a per-account basis, even at low volumes of several thousand accounts. Thus, with a mature telematics market, there is a straightforward and compelling business case for private providers to build RUC apps that measure mileage, provide account management services to motorists, collect payments behalf of ODOT, and remit payments to ODOT. This is comparable to telecommunications companies collecting taxes from their customers on behalf of government agencies.

Business Case for RUC as a Standalone Service

Another way for the private sector to provide RUC services as envisioned by the Legislature and ODOT is for private entities to build systems specifically for RUC. Since ODOT cannot justify fully funding the setup and operation of a system, the private sector must be able to construct a compelling long-term business case based on cost recovery through a combination of its own investment, RUC collection fees from the state, and sales of related, value-added services to customers. By building a RUC service from the start, a CSP might attempt to capture market share early and recover investment through management of a large volume of accounts as the number of vehicles mandated to pay RUC grows over the next decade from the thousands into the millions across multiple jurisdictions. This approach is the inverse of the “RUC as an app” scenario, but is nonetheless compelling.

An example of private sector involvement of this type worthy of mention is the open market approach to toll services and account management promulgated by the National Roads Administration of Ireland. Several private, independent Toll Service Providers (TSPs) have flourished in that market. TSPs began with toll payment services only, but were able to augment their income by developing a range of value-added services including car park lanes for tag users, secured access to private property, and taxi management at Dublin International Airport.

Drivers of the Business Case for RUC

In addition to the business opportunity to provide other revenue-generating services to motorists alongside RUC, several recent developments in the promotion and development of RUC in the U.S. further support the business case for private sector entities to step up to the plate and invest from “day one.” The key developments and market interest can be summarized as follows:

- **Developments in Washington State and Nevada.** Active participation of these states in the recently completed RUCPP has helped persuade a number of prospective private companies that RUC will take off and will not be an Oregon-only policy, i.e., the market will grow and therefore likely justify significant investments from private companies willing to take a long-term perspective for their return on investment (ROI). Combined, the three states have 11 million registered light vehicles, which is a sizeable market in itself, yet still represents only about 4% of the total U.S. vehicle market.
- **Western States RUC Consortium.** The recent formation of this formal alliance via inter-governmental agreements replete with a charter, in addition to the RUCPP success, has raised eyebrows across potential private sector companies in North America and Europe. The importance of this alliance is hard to quantify, but its sheer existence and a potentially identifiable market development path lends important credence to incite the private sector to invest from Day One. The cooperation of the states indicates to industry that there will be interoperability; common standards and certification practices, thereby setting a regional market with lower start-up costs; and a common platform for interstate exchange of data. All three provide a highly desirable environment with sufficient initial market size to prosper in the long term as other states may join or expand the consortium.
- **Feedback from private sector.** ODOT and its Consultant have actively promoted the open market and private sector involvement approach at numerous conferences in the U.S., Europe and elsewhere, and via interviews with the media and technical papers published in targeted trade journals. The common refrain that can be paraphrased from private sector companies involved in tolling and road pricing activities around the world is: “We hope that Oregon moves forward and we will invest as this will usher in a new and fledgling market that we must get into from Day One as part of the transition to road usage charging.” In other words, the private sector understand that the current financial woes besieging the public sector due to deteriorating revenue streams will eventually force more states to follow (and many countries around the world) to phase in distance-based road usage charging as the most viable, equitable, and sustainable revenue source to maintain the transportation system into the future.
- **Oregon as a watershed.** As with the fuel tax in 1919, Oregon is at the cusp of a major paradigm shift in the way that jurisdictions raise revenue to pay for road maintenance. The private sector is well aware of the dire revenue needs of state governments and the U.S. federal government. They have been tracking developments in alternative revenue mechanisms such as public-private partnerships, HOT lanes, point tolling, and debt financing. These approaches can be described as stop-gap revenue mechanisms that have failed to address the broader problem of erosion of fuels tax revenues in a meaningful way due to improvements in fuel economy. Numerous blue-ribbon commissions at the federal level as well as policy task forces within numerous states that have studied the issue and recognize the shortcomings of these other revenue mechanisms. Many have recommended road usage charging of the variety being pursued in Oregon as a long-term replacement for fuel taxes. Once Oregon moves forward with road usage charging, other states may quickly follow, as well as jurisdictions in Canada. The private sector

is well aware of this “domino” effect, and there are expectations that competing CSPs may attempt to position themselves as the preferred provider of road usage charging services through reduced costs and enhanced services. Industry understands that future market capture will depend on credentials and demonstrated capabilities. With both, industry can grow its market share as the demand for RUC outside of Oregon grows.

It is generally true that any entrepreneur or private company in the RUC and vehicle telematics space is exposed to risk. Furthermore, it can be assumed that, due to the key developments and market interest, ODOT will likely not be required to shoulder all or even a substantial share of that risk. The establishment and promotion of a new RUC market will be the responsibility of government, but the risks associated with RUC (account management) are most appropriately borne by industry, who ultimately are better positioned to reap the rewards of first mover status. Experience, demonstrated capabilities and credentials of established early market developers is well understood across industry as the best way to grow a new market when it matures and explodes. Once the market matures and there are potentially millions of RUC-subject vehicles in several states (potentially contiguous) and concomitant sales of value-added services to consumers, the investment by early development companies pays off.

Key Observations

As part of the research and industry outreach undertaken by the consultants, the following key market agents were researched in order to gain a better understanding of the observations, assumptions and cost estimates for building and selling hardware, setting up and running RUC operations including communications and data provision.

- **Hardware.** Costs associated with any aftermarket hardware to support RUC, not including the costs of vehicles, built-in telematics or telecommunications equipment such as smartphones already owned by RUC payers or OBDII plug-in mileage reporting devices.
- **Communications.** Costs associated with communicating mileage data from the vehicle to the RUC back office.
- **Data provider.** At this time, data providers are not expected to add substantial if any costs to the RUC data “supply chain.”
- **CSP.** Upfront investment and ongoing operations costs associated with RUC payer account management by private entities.

Based on the above discussion as well as research and discussions with market players, several key observations have been gleaned:

- It is reasonable to expect a substantial offset of the cost of RUC system elements in the Day One scenario due to the current private sector interest and potential for market growth. However, the near-term ability of CSPs to cover all capital outlays (CAPEX) and operational expenses (OPEX) through value-added service revenue is unlikely. In order to minimize compensation by ODOT, CSPs must be willing to risk short- and (perhaps) medium-term (up to 10 years) investment for long-term market

share and associated revenues. The prospects are healthy, particularly from companies involved in road pricing and tolling, insurance, telematics, and telecommunications.

- In the short term start-up of the RUC market, it is expected that CSPs will do everything they can to strike advantageous deals with hardware suppliers, communications providers and other service suppliers to minimize their market start-up costs. Efficiency will dictate the formulation of the early years as well as marketing and aggressive efforts to sign-up as many customers as possible. In a transaction processing environment, such as RUC, every effort by industry to create a critical mass or break-even point will be the initial key performance metric for their business. These attributes serve industry, government, and the general public well in the adoption of a new concept such as RUC.
- When the RUC market becomes larger or value added services are profitable, CSPs will likely recover RUC costs with little or no margin as part of a variable service offering, whether provided via telematics or aftermarket hardware.
- The perspective for near-term involvement and investment changes radically if private sector companies that have already built the systems necessary for RUC decide that a longer term investment is worthwhile, given the market growth potential for just RUC, e.g., Western RUC Consortium. Thus, the costs to the public sector could be intricately tied to the private sector business case in terms of an opportunity to recognize growth in a potentially huge market (tens of millions of vehicles in the U.S. and Europe) as they invest directly in RUC from the early stages.
- The ITS (Intelligent Transportation Systems) and telematics markets are evolving rapidly in tandem with the potential implementation of RUC in Oregon. Various private sector entities have expressed interest in the RUC market and appreciate the fact that the service model is evolving rapidly.

The transitions described below demonstrate significant trends that will allow for efficiencies to emerge and corresponding costs to decline:

- **From** the pure (traditional) service model with clearly defined capital outlays (CAPEX) and operational expenses (OPEX) **To** a world comprising cloud storage and hosting with monthly or annual service fees.
 - Companies like Amazon, Microsoft, Rackspace, and many others provide storage and hosting.
 - The vision for RUC in Oregon is based on a market-driven approach, which allows providers to ride the prospective wave of cloud computing with minimal procurement of costly IT equipment.
- **From** aftermarket hardware **To** in-vehicle platforms built to accommodate services and apps such as RUC.
 - Almost all of the major automakers, including General Motors, have indicated that they will “open” the market for apps by outside developers (subject to approval, just as is done in the Apple app ecosystem).

- Even for vehicles that may still rely on aftermarket hardware such as the mileage reporting devices used in the RUCPP, the cost of these devices is declining dramatically as demand for them increases.
- **From** costly telecommunications **To** competitive communications business models for machine to machine (M2M) communications.
 - The cost of M2M communications (e.g., from the aftermarket device to the road charge processor) has steadily declined in the past decade.
 - To date, telecommunications providers have focused on handheld devices (cellular phones and smartphones), a market segment which is now saturated. Now, many telecommunications companies are turning their attention to the M2M market, which is seen as a high-growth segment that will likely create opportunities for further reduction in communication costs for RUC. In order to grow this segment, providers must create compelling opportunities for M2M through innovative business models and bundling of services that will likely lead to lower costs.
 - As an example of the above trends, automotive telematics providers have begun to enter strategic alliances with telecommunications providers in order to lower costs and extend the range of in-vehicle services that can be provided on telematics platforms.
 - Approaches that build on individual RUC payers' existing telecommunications plans (whether from a smartphone, the vehicle's communications link, or some other means) will reduce the marginal cost of RUC communications to the minimum margins or near-zero, as only a very small amount of data is required (currently about 1 MB per month). The RUCPP has already demonstrated the prospect of utilizing an individual's smartphone for transmission of RUC mileage message data from the vehicle to the back office. There are expectations that this low-cost concept will work for the segment of RUC payers who choose a plan that allows using a personal device for RUC communications, should one be available.

Summary of Scenarios for Market Involvement

Based on these observations, we can summarize the following three key scenarios for private sector involvement comprises:

1. **Investment in RUC from Day One** in order to be in the vanguard of future developments in other US states and other countries around the world. It should be noted that a number of U.S. and international companies are very interested in RUC from a long-term investment opportunity with potentially positive ROI.
2. **Initial investment and development of RUC** as a catalyst that will bring RUC customers (who are mandated to pay the RUC) to a CSP as the basis for developing and offering value added services to RUC payers.

3. **Addition of a RUC app by a CSP** that has existing customers for value-added services such as insurance, concierge services, safety and crash assistance, data connectivity, driver monitoring, navigation, and more. Current examples of such opportunities include:
- GM's OnStar. The basic "Safe and Sound" service is available for \$200/year. The full package includes "Safe and Sound" plus turn-by-turn navigation for \$300/year. There are currently about 6 million subscribers to OnStar, or about 10% of GM vehicles in the U.S. Depending on the vehicle model, OnStar is free for 6 months to 3 years.
 - Ford Sync comes standard on many vehicles and priced at about \$300 on some models. After up to 3 years free, annual subscriptions are about \$60.
 - PAYD insurance providers build the cost of operations into the premiums and/or sales of data to insurance companies and other third party data consumers.
 - Inrix which aggregates traffic data and re-sells it to public agencies and private entities for use in applications ranging from infrastructure planning to consumer services such as traffic and travel time information.
 - Several start-up "concierge" service providers offer services for free once the customer has paid for the device. It is presumed they derive revenues from sale of data.

Key Cost and Revenue Categories

As part of the research undertaken, the following key cost and revenue categories were defined and discussed with a range of private sector entities:

- **Costs:**
 - **CAPEX**
 - Hardware costs: Basic and Advanced aftermarket mileage reporting devices (MRDs). Note that telematics platforms costs were not discussed as these are sunk costs borne by automakers.
 - System-wide CAPEX at startup for RUC transactions processing, account management, and customer service systems. Note that these costs do not include MRDs.
 - **OPEX** comprise several distinct yet directly correlated categories of operating/administrative costs:
 - Annual cost of communications associated with RUC on a per vehicle basis at various volumes.
 - Annual CSP account management costs per account.
 - Other system-wide annual operating costs.
- RUC revenues are estimated for various scenarios.

- Metrics include:
 - Operating costs as a percentage of RUC revenues.
 - Annual operating/administrative costs per RUC payer account.

During the research process, a number of important parameters for some of the cost and revenue categories were identified:

- Market cost of procuring MRDs (Mileage Recording Devices) on a per-unit basis includes product development costs:
 - The manufacture and assemble cost of an MRD is normally about 20% of the sales price.
 - Advanced MRD: Add \$5 for the cost of installing a GPS antenna, although in the very near future, advanced MRDs may be the same or lower in price as basic MRDs due to the higher production volumes.
- Creating and setting up a back office: This includes costs of developing software and implementation to accommodate RUC, and likely piggybacking on an existing back office.
- Customer service center/call center set up (front office):
 - Goal would be to integrate the Help Desk within an existing structure, including web-based interface for RUC payers to query and check the status of their respective accounts, hotline Help Desk, etc.
 - To reduce costs, a CSP might rely on Voice Over IP (VOIP) for smaller volumes of calls, as phone systems are costly to implement.
 - This is considered a very expensive part of the CSP set up.
- Mileage message processing and bank interfaces:
 - This is considered a one-time set up cost as part of confirming the open systems approach – it entails getting the data off the vehicle to the road charge processor. It is also likely the same cost for all unit variations.
 - Bank fees can range from 0.4 to 5% of monies collected. This may require specific interfaces and can cost \$10-15k per interface. An alternative would be to have one interface to a payment service gateway provider like Moneris.
 - Costs depend on how mature the CSP is and how the mature development environment (software) is.

- Bundling of services and batching of bank transactions to lower or spread costs across several applications, thereby lowering the cost for each.

Summary of Costs and Revenues

Developing precise forecasts for costs of hardware, CAPEX and OPEX for a brand new RUC system is impossible. The only certainty when researching CAPEX and OPEX costs is that the forecasts will be wrong. In recent years as severe and often unprecedented forces have shaken the world's economy, economic forecasters have struggled to forecast the timing and/or extent of the economic recovery accurately.

The following summary does not provide point estimates of future costs. Rather, the research is based on estimates and futuristic thinking of industry experts and company representatives. The key point to keep in mind is that the market is brand new and there is a significant amount of private sector interest in working with Oregon (and the Western State RUC Consortium) under the paradigm of public-private partnerships. Notwithstanding, some industry skepticism does exist, which will require professional communications and marketing support to ODOT to help work with industry to ensure to the highest degree of probability that the open market approach with private sector account management works to the mutual benefit and satisfaction of the Oregon Legislature, ODOT, RUC payers, and private sector entities.

Hardware costs. As noted above, basic and advanced aftermarket devices have a marginal cost difference of about \$5 for the GPS antenna. Given the original program in Oregon will be less than 10,000 RUC liable vehicles, the estimates for per unit costs are quite high, ranging from \$50 up to \$80. However, more research should be undertaken to better ascertain the market trends in the next two years in terms of price drops due to hardware suppliers deciding to invest in MRDs and subsequently couple the production of RUC-specified mileage reporting devices (MRDs) with MRDs used for PAYD insurance. Such a trend could have a major impact on reducing this cost category.

Other system-wide CAPEX. The estimated CAPEX costs for setting up a CSP vary significantly, from \$500k for 10,000 vehicles to as much as \$10 million for a volume of 1 million vehicles (not counting hardware costs). These costs should be understood in light of the fact that most CSPs in Oregon (and other states) will most likely transition from the 10,000 vehicle startup scenario to 1 million vehicles which should keep the overall CAPEX very low once a player is established in the market.

Total annual OPEX (operating/administrative costs) per RUC payer account. This is estimated to range from \$100+ per account when there are 10,000 RUC liable vehicles and drop to as low as \$20 per account at higher volumes of over 1 million vehicles. This cost comprises two key categories, viz. system wide annual operating costs, and annual CSP account management costs per account. Again, the vast majority of these costs can be covered by the private sectors that see a business case for selling in-vehicle services through telematics platforms.

- *System wide annual operating costs.* This is an important recurrent cost that may require higher collection fees from ODOT during the first few years of RUC operation. However, it should be pointed out that there will be a number of

opportunities to interact with the private sector in order to both drive down these costs as back office operations become more and more streamlined in the road pricing industry, and impart on the private sector the need for them to invest for a long-term market that will only continue to grow perhaps exponentially.

- *CSP account management costs per account.* This cost per account is a major cost category where discussions and negotiations with private sector entities will be determinant in terms of their providing investments to alleviate the negative implications of high OPEX during the first few years.
- *Annual cost of communications per device.* This is potentially a high cost per account, even for relatively low data transfer volumes (estimated to be no more than about 1MB of data per month per account, on average) during the first few years due to the low number of RUC liable vehicles.
 - Communications costs could decline to near zero for some CSPs, if they develop a solution that accesses a RUC payer's existing cellular data communications plan, and the solution passes ODOT certification. This concept was demonstrated in the RUCPP for the "Smartphone plan." Should a similar future solution emerge for RUC in real operations, communications costs could be reduced significantly or avoided altogether for the segment of RUC payers who are eligible for and choose such a plan.
 - Notwithstanding the possibility of bundling RUC communications on a RUC payer's existing data plan, market conditions may require M2M communications for the MRDs. Current estimates for M2M communications on the order of 1MB per month range from \$3 to \$5 (assuming one transmission per vehicle per day) or \$36 to \$60 per year per account. The costs of \$36-60 per year reflect several factors:
 - First, M2M communications costs do not scale down as the volume of data decreases (e.g., \$30/month for 2GB does not mean that it should \$0.015 per month for only 1MB). Instead, communications costs reflect the frequency of data transmission. Each transmission, even if it contains only a very small amount of data, requires signaling between the MRD and the cellular network, which drives the costs. As such, ODOT will examine the viability of less frequent electronic reporting to reduce costs.
 - More importantly, these are the prices that the market will bear at present. Communications costs are expected to decline between now and the July 2015 RUC start date as the cellular networks for M2M transition from 2G to 3G to LTE and capacity for M2M becomes available. Future research, analysis, and negotiations will help ODOT and industry to structure a business model that achieves acceptable costs during the first several years of operation. Trends indicate that by the time RUC reaches a higher volume of vehicles (1+ million), these costs may decline to as low as \$12-24/year (for once per day reporting).
- *Profit margins.* This analysis has not factored profit margins. Ultimately, CSPs will judge their participation in RUC by their ability to generate profits both to repay the initial investment and to generate continuing value for shareholders. Presently, telematics profit margins are on the order of magnitude of 50%. While RUC may not

be able to command these levels of profit in early years, once the system is established, the costs will steadily decline and revenues increase as the volume of vehicles increases. Although price pressures for value-added services may not allow revenues to scale linearly with volume, the margins will likely increase to levels that are attractive to early investors.

Approximate RUC revenues. Based on forecasts of the vehicle fleet and driving behavior, annual revenue is estimated at approximately \$130 per RUC payer. At 10,000 vehicles, this translates to approximately \$1.3 million in gross revenues, which jumps to \$130 million when 1 million vehicles are subject to RUC.

ODOT Financial Model

Updates

The costs and revenues as presented in this report for economic viability thus far relate only to private administration of RUC payer accounts by CSPs. The financial model complements those cost estimates by providing estimates of ODOT's costs for such activities as ODOT account management, contract management with CSPs, program evaluation, communications and outreach, enforcement and compliance, and overall program management. The cost estimates are also linked to alternative vehicle forecasts and organizational frameworks, allowing the modeler to test numerous scenarios.

The financial model has been updated with several additional features not previously included, as follows:

- Most importantly, the modeler now has the ability to input three forms of compensation for CSPs: transaction fee (% of RUC revenues collected by CSPs), flat amount per account, and/or minimum guarantees. Each value is variable in each year 2013-2035. Based on research conducted jointly with ODOT on private sector costs as part of this task, the modeler can input more refined and informed values for these variables than in previous versions.
- Updated compliance cost module, showing the trade-offs between compliance costs and RUC evasion, including an output showing evasion as a percent of total revenues.
- The cost model has been tested to ensure that the possible parameters of a manual method of reporting RUC are correctly captured and that cost estimates for this approach are reasonable, depending on the number of RUC payers who pay via manual reporting.
- Updated communications costs for MRDs, including the ability to determine what proportion of those costs will be covered by ODOT for RUC payers who have ODOT Basic plans.

Assumptions

In order to generate up-to-date estimates of ODOT's costs, we employed the financial model. Due to the large number of variables available for input by the modeler, we chose to generate two scenarios: low-cost and high-cost. These two scenarios are meant not to reflect the absolute maximum and minimum costs, but rather notional low-end and high-end ODOT costs associated with the RUC concept.

The assumptions for the two scenarios are captured in the lists below:

- Low-cost scenario assumptions:
 - Fleet forecast Scenario X. Rate of 1.55 cents per mile applied to all vehicles 55+ MPG as well as 5,000 volunteers. The volunteers are assumed to have an average MPG of 25 and drive 10,000 miles per year.
 - ODOT will pay 100% of the certification costs in 2013-2015, 75% in 2016, and 50% in 2017, and 0% thereafter.
 - ODOT will neither subsidize MRDs for RUC payers selecting an ODOT Basic plan, nor cover any communications costs associated with any MRDs on the ODOT Basic plan.
 - ODOT will audit 2% of basic accounts, 3% of manual accounts, and no CSP RUC payer accounts.
 - 90% of RUC payers will have accounts managed by a CSP. Among the 10% with ODOT-managed accounts:
 - 90% will choose a Basic plan
 - 8% will pay Flat Annual RUC
 - 2% will pay using a manual reporting option.
- High-cost scenario assumptions:
 - Fleet forecast Scenario X. Rate of 1.55 cents per mile applied to all vehicles 55+ MPG as well as 5,000 volunteers. The volunteers are assumed to have an average MPG of 17.5 and drive 12,000 miles per year.
 - ODOT will pay 100% of the certification costs from 2013-2020, 50% from 2021-2025, and 0% thereafter.
 - ODOT will subsidize MRDs at a cost of \$50 per device for the first 5,000 RUC payers on the ODOT Basic plan.
 - ODOT will cover 50% of the communications costs for RUC payer MRDs on an ODOT Basic plan (starting at \$30/year in 2015 and declining to \$3/year by 2035).
 - ODOT will audit 3% of basic accounts, 5% of manual accounts, and 0% of CSP RUC payer accounts.

- 75% of RUC payers will have accounts managed by a CSP. Among the 25% with ODOT-managed accounts:
 - 45% will choose a Basic plan
 - 50% will pay using a manual reporting option
 - 5% will pay Flat Annual RUC.

Updated Findings

The table below summarizes the findings based on the ODOT financial model. Costs are summarized across categories. The table also includes ODOT's total annual costs (OPEX), initial setup costs (CAPEX), gross RUC revenues, and a measure of OPEX as a percentage of gross revenues. This latter value also translates into a cost per RUC payer.

The model was used to generate estimates for a range of vehicle volumes. As illustrated in Table 3, using fleet forecast Scenario X, we were able to generate three points in time with distinct numbers of vehicles: approximately 15k vehicles by 2016, 102k by 2021, and 1 million by 2035. As the volume of vehicles increases, the costs as a percent of revenues and per-account operating costs decline substantially from about 50% to about 10% when there are 100k vehicles and under 5% when there are 1 million vehicles. Although these costs do not reflect any compensation provided to CSPs, they nonetheless validate the assumption that RUC services as envisioned in Oregon are highly scalable, with costs declining steeply as volumes increase.

Table 3: Summary of ODOT costs associated with RUC

Category (annual costs incurred by ODOT)	2016 (15k accounts)	2021 (102k accounts)	2035 (1M accounts)
Account management ³	\$16k – \$68k	\$86k - \$350k	\$340k - \$1.1M
Compliance (education, outreach, audit) ⁴	\$36k – \$57k	\$240k - \$380k	\$1.9M - \$3.2M
Program evaluation	\$110k	\$0k	\$0k
Certification	\$220k – \$290k	\$0k - \$150k	\$0k
Other ODOT staff ⁵	\$710k	\$850k	\$2.2M
Total operating costs ⁶	\$1.1M - \$1.3M	\$1.2M - \$1.7M	\$4.5M - \$6.5M
Total RUC revenues	\$2.2M - \$2.5M	\$15M - \$16M	\$140M - \$150M
Total operating costs as a % of total RUC revenues	49% - 54%	8.0% - 11%	3.1% - 4.4%
Total operating costs per RUC payer account	\$72 - \$87	\$12 - \$17	\$4.5 - \$6.5

For the sake of comparison, the table below from the RUCPP evaluation report provides estimates of RUC and fuels tax collection costs. The two revenue sources compare more favorably when analyzing their collection costs at similar volumes.

³ Account management costs comprise merchant transaction fees, staff for account handling and customer service, and MRD communications.

⁴ This category includes material costs for education, outreach, and audit, as well as staff for conducting audits.

⁵ This category includes staff for RUC management, contracting, communications, compliance analytics, and technology development that are not already counted toward another cost category.

⁶ These annual operating costs do not include setup costs expected to be incurred in the 2013-2015 biennium which are estimated at approximately \$3.2 million per HB 2453 Fiscal Impact Statement.

Table 4: Comparison of RUC and fuel tax costs at equivalent program sizes

Program	10,000 vehicles	1 million vehicles	3 million vehicles ⁷
RUC	~\$1.9 million revenues ~\$1 million annual operating costs costs of 40-60% of revenues	~\$190 million revenues <\$20 million annual operating costs costs of 3-11% of revenues	~\$570 million revenues <\$30 million annual operating costs costs of 0-5% of revenues
Fuels Tax	~\$1.7 million revenues ~\$0.5 -1 million annual operating costs costs of 30-60% of revenues	~\$170 million revenues ~\$1-\$1.5 million annual operating costs costs ~0.6%-1% of revenues*	~\$540 million revenues ~\$1.9 million annual operating costs costs of 0.4% of revenues ⁸

ODOT recognizes that CSPs will be able to deliver RUC services at costs below what ODOT would be able to achieve in the long term. However, should CSPs be unable to develop business models that include acceptable costs in the near term, ODOT can and will set up and operate a RUC system without participation by CSPs. Based on the financial modeling tool used to generate the estimates above, ODOT can create a “public sector comparator” and determine a target cost level that it will seek from the private sector, both in the short and long terms.

⁷ The volume of 3 million vehicles is used for illustrative purposes only as there are no plans to expand RUC to 3 million vehicles in Oregon.

⁸ Use fuel tax has an additional cost of 4% of revenues.

Summary of Findings

Based on the research as described above, we believe that the RUC policy and concepts, as currently formulated in Oregon, will be economically viable from the perspective of all salient stakeholders on July 1, 2015, and increasingly so as the program grows beyond that.

To further illustrate the results of the economic viability analysis graphically in summary fashion, we have employed radar charts. The table below is a legend for interpreting the numerical ranking of the radar charts, which are presented later.

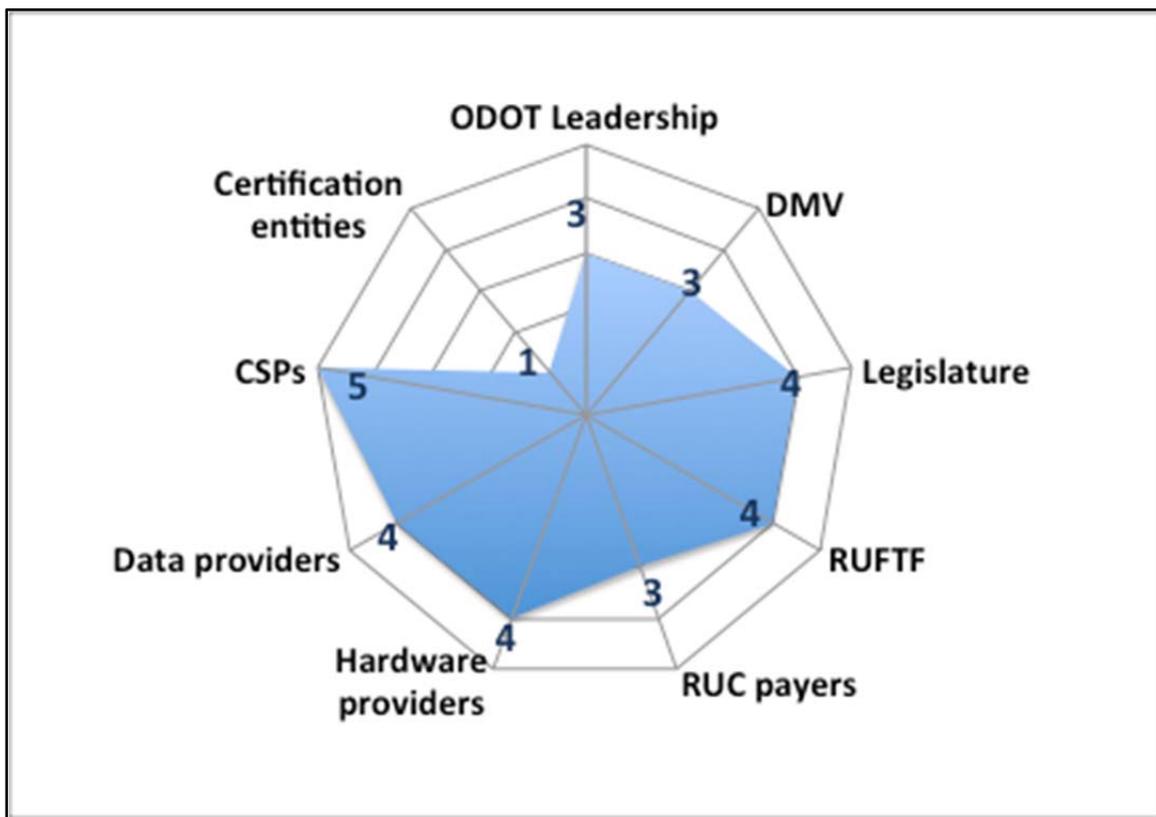
Table 5: Radar Chart Legend

Stakeholder	1	2	3	4	5
Legislature	Scenario does not meet any policy requirements as set out in the bill	Scenario meets some of the policy requirements as set forth in the bill	Scenario meets all key policy requirements as set forth in the bill	Scenario meets all key policy requirements and most of the other requirements	Scenario meets all policy requirements of the legislature
RUFTF	Scenario does not meet any policy requirements of RUFTF	Scenario meets some of the policy requirements of RUFTF	Scenario meets all key policy requirements of RUFTF	Scenario meets all key requirements and most other RUFTF requirements	Scenario meets all policy requirements of RUFTF
ODOT	Scenario is very costly for ODOT, with costs exceeding 100% of revenues	Scenario is costly for ODOT, with costs between 75-99% of revenues	Costs as a percent of revenues are between 50-75%	Costs as a percent of revenues are between 10-50%	Costs as a percent of revenues are <10%
DMV	Scenario is very costly/disruptive for DMV	Scenario is moderately costly/disruptive for DMV	Scenario adds minor costs and disruptions to DMV	Scenario adds only minor costs or disruptions to DMV	Scenario adds no costs or disruptions to DMV
RUC payers	Scenario will create unacceptable costs and/or requirements for most users	Scenario creates burdensome costs and/or requirements for users	Scenario creates some costs and/or requirements for users beyond RUC	Scenario creates few costs and/or requirements for users beyond paying RUC	Scenario creates no costs or requirements for users beyond paying RUC
CSPs	No CSPs will exist for RUC	Only 1 CSP to provide service to limited vehicles	>1 CSP to provide service to limited vehicles	Only 1 CSP to provide service to most vehicles	>1 CSP to provide service to most vehicles
Hardware providers	No hardware will be provided to support RUC	Hardware provided for limited vehicles via 1 CSP	Hardware provided for most vehicles via 1 CSP	Hardware provided for most vehicles via >1 CSP	Hardware provided for all vehicles via >1 CSP

Stakeholder	1	2	3	4	5
Data providers	No data will be provided to support RUC	Data provided for limited vehicles via 1 CSP	Data provided for most vehicles via 1 CSP	Data provided for most vehicles via >1 CSP	Data provided for all vehicles via >1 CSP
Certification entities	CEs will not enter the RUC marketplace	CEs provide only limited hardware certification	CEs provide ongoing hardware certification	CEs provide limited certification of hardware and business processes	CEs provide ongoing certification of hardware and business processes

The radar chart below summarizes the economic viability of the proposed concept for RUC in Oregon at Day One (July 1, 2015). Explanations of the scores follow.

Figure 3: Radar Chart Scoring of RUC at Day One

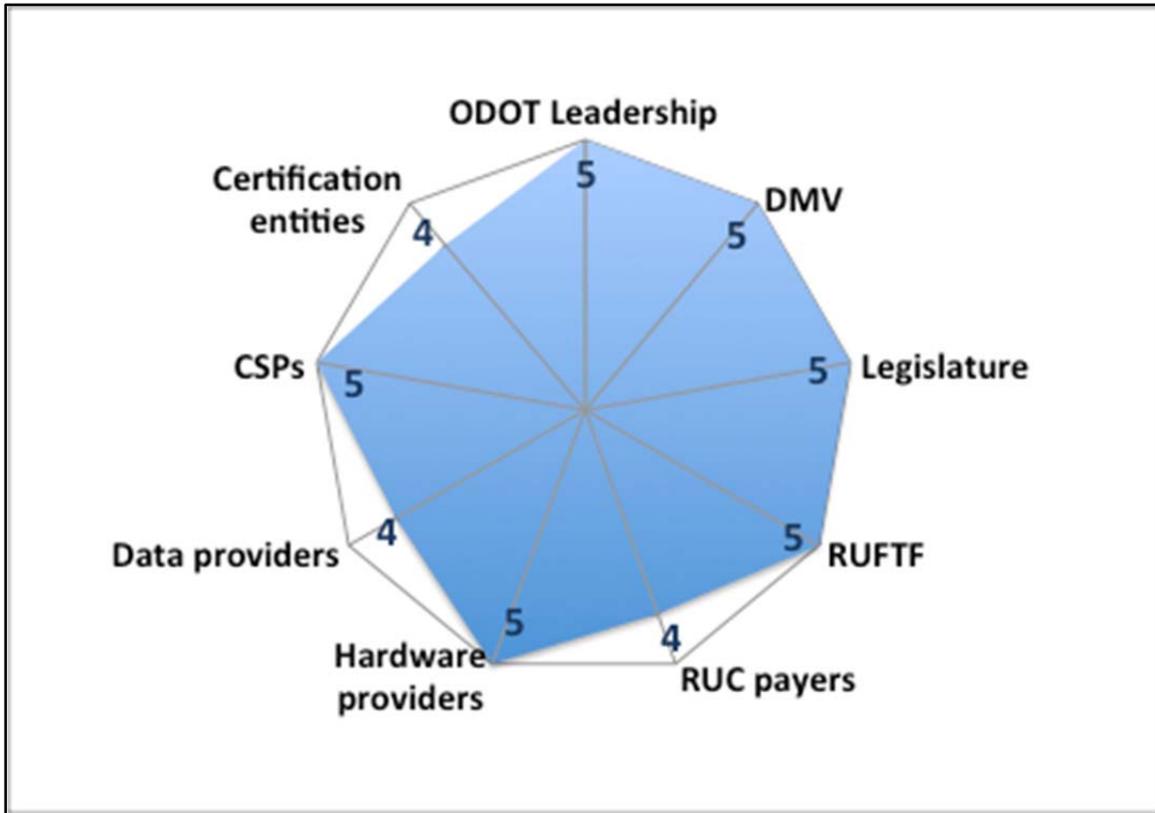


- **ODOT** leadership sees RUC as viable despite a score of 3 (corresponding with costs 50-75% of revenues). This is economically viable for several reasons: (1) Net revenues of \$1-5 million per year will be derived from highly fuel efficient vehicles who otherwise would be paying very little if any fuel tax into the state highway trust fund for the first several years of the program, and (2) The RUC system is highly scalable, such that as the number of vehicles in the program grows, ODOT's costs will decline and net revenues will continue to grow.

- **DMV** will be asked to develop some aspects of the overall RUC concept, resulting in minor costs and disruptions that will be largely confined to the early years of RUC operations.
- **The Legislature and RUFTF** will see a RUC system that reflects all of the policy goals as set forth in law and according to recommendations made by RUFTF. There may be preferences among legislators and RUFTF members that go unmet in the early years, but all expressed policy will be implemented by ODOT.
- **Market agents** will proliferate, particularly CSPs, who will attempt to build competitive teams in order to capture the early RUC market in Oregon as completely as possible as a precursor to marketing in other states. While we expect more than one CSP to compete in this space, we are slightly less certain of the participation level of data providers and hardware providers, for which 100% coverage of all vehicles is not necessary for a viable system. The private sector's impetus to provide RUC services is clear for several reasons.
 - First, RUC is a revenue opportunity due to the likelihood that ODOT will allow collectors to retain a fee. Although ODOT has not decided the particular fee mechanism or amount, precedents from tolling systems and similar tax programs suggest a fee at or below 10% of revenues. Higher volumes of vehicles will further reduce administrative and operational costs as a percentage of revenues/
 - Second, RUC is likely to be a marginal addition to a larger platform such as in-vehicle telematics, with marginal costs of implementation and operation close to zero, making RUC a viable service offering even at low vehicle volumes.
 - Third, RUC represents one among a range of potential services that private providers can market to motorists.
 - Lastly, all market agents will be attempting to grow market share (% of vehicles subscribing to their services), and since Oregon will be the "first mover" to implement RUC, a number of entrepreneurial companies will be interested in investing and competing in Oregon in order to capture as much of the RUC market as early as possible in anticipation of a "domino effect" of other states and provinces following suit to implement RUC policies.
- **Certification entities** are not necessary at Day One, as ODOT is very likely to undertake certification itself until there is a market for external certification entities.
- **RUC payers** themselves will have to endure some costs and inconveniences at Day One due to the early nature of their participation.

In a mature RUC market, the case for economic viability is even more compelling than at Day One, since costs will have declined, technology improved, CSP service offerings diversified, and volumes of vehicles subject to RUC increased drastically. With the telematics model for RUC service provision (whether factory-installed or aftermarket), and with market penetration of telematics well over 50% by the time RUC is a Mature System, the viability is straightforward and strong as illustrated in the radar chart below showing scores of all 4's and 5's.

Figure 4: Radar Chart Scoring of Mature RUC System



Additional conclusions are summarized as follows:

- The ability to reduce CSP compensation to a level that is acceptable to ODOT (i.e., a compensation level that does not substantially degrade RUC revenues) is a central task for ODOT to undertake via additional research, analysis, and negotiations in the coming biennium, prior to proposed implementation of RUC in July 2015. The precise level of acceptability for CSP compensation is likely to change over time, but no level has been expressed either by the Legislature or by ODOT leadership to date. Certainly anything exceeding 50% of RUC revenues will be deemed unacceptable. More likely, the ideal range for compensation is in the 0-10% range, based on precedents from other taxes collected by private third parties in Oregon: cigarette tax collectors are compensated 0%; use fuel tax sellers are compensated 4%; and hotels are compensated 5% for collection of the state lodging tax. ODOT has a range of compensation mechanisms at its disposal such as transaction-based service fees, account management fees, and minimum guarantees, among others. Due to the “crowded space” that CSPs will occupy in the early years for a relatively small number of accounts, ODOT must use these compensation mechanisms sparingly and effectively in order to drive down costs while ensuring a reasonable prospect for survival of at least one CSP and low barriers to entry for others.
- In order to drive profitability, CSPs will continuously seek to reduce costs. They will complement this effort by increasing revenues from services. There are two ways CSPs can achieve success by expanding services, relative to RUC: (1) By adding RUC as an additional service on top of existing services (“RUC as an app”), and (2)

Starting with RUC and building other services on top of it (“RUC as a standalone service”). ODOT should consider that while the former is a much lower cost approach and likely to emerge as part of the Mature RUC System, the latter is more likely to occur at Day One. It is in ODOT’s interest to ensure that, in negotiations with CSPs, it identifies those CSPs with long-term business plans that involve taking advantage of the RUC platform to sell other services and reduce compensation from ODOT as quickly as possible.

- Another key to achieving economic viability using CSPs on Day One will be in finding a market agent with entrepreneurial vision, financial backing, and long-term horizon for business development that will allow them to accept early losses in an enterprise focused on RUC, while adding other services to consumers that will allow for ultimate profitability. This implies that for CSPs to be successful, ODOT should allow CSPs to market value added services to RUC payers, subject to appropriate opt-out clauses.

Although this document has not represented an exhaustive business case, it has provided the rudiments of a business case by analyzing the economic positions of key stakeholders as well as the conditions under which RUC is economically viable for them. Implementing RUC in a cost-effective way that capitalizes on the market trends emphasized in this document will not be simple. To the contrary, ODOT must focus its limited resources on maximizing market participation in RUC while minimizing costs to the State. In the long run, the market for RUC will materialize on its own, but in the short run (and especially between now and 2015), ODOT must work cleverly and carefully with industry to formulate and encourage business models that can perform effectively while surviving to “grow into” the more sustainable, longer-term “RUC as an app” business model.

Appendix A: Task Objectives

- Provide estimates of costs, revenues, and requirements associated with the road usage charging program for each of the major stakeholders, including compensation of market agents such as hardware providers, data providers, and CSPs (certified service providers), and an assessment of overall viability from each stakeholder's perspective. This overall assessment will include cost effectiveness, organizational viability, and public acceptance considerations.
- Provide a range of cost and revenue estimates based on CONOPS scenarios that reflect adoption rates of subject vehicles, evolution in technologies and business models in the market place, and policy changes regarding subject vehicles.
- Provide updates to related tasks including CONOPS (Task 2), financial model (WOC 1 Task 11), organizational framework update (WOC 1 Task 1.4OP), manual methods concepts (WOC 1 Task 1.4C), and others as appropriate.

Appendix B: Methodology

The combined ODOT-Consultant team will undertake the following steps to complete this economic viability analysis.

- Conduct ODOT cost and revenue modeling using the financial model for each CONOPS scenario, utilizing the model enhancements as well as additional information about market agents (hardware providers, data providers, CSPs, certification entities and RUC payers) provided as an input to parameter selection.
- Analyze feedback from industry attained via market research and interviews with relevant industry stakeholders.
- Conduct market agent cost and revenue estimation for each CONOPS scenario.
- Conduct stakeholder analysis for each CONOPS scenario.
- Complete policy matrix for each CONOPS scenario.
- Summarize results as an economic viability analysis memo to be presented to ODOT and CONOPS team for consideration in the next iteration.

During the preparation of the economic viability analysis, the team will collaborate with the CONOPS team to ensure correct understanding and interpretation of the evolving CONOPS documentation. In addition, the economic viability team will incorporate inputs as necessary from the manual methods, organizational framework, RUC accounting, risk analysis, and implementation plan tasks.

Appendix C: Policy Matrix

Policy requirement	HB 2453 reference (section of bill)	RUFF reference (policy statement)	Corresponding system element as described in RUC CONOPS (to be updated)
RUC as a condition of registration: RUC payer must notify Dept that the vehicle is subject to RUC	2453-B:21	October 2011 meeting	Discussed in Section 5.2.1, with various related scenarios in Section 7.2
Vehicles subject to RUC if 55 MPG or MPG-e or greater with at least 4 wheels in contact with ground	2453-B:2(3)	Sept 2012 meeting	Stated in Section 1.3 (Definitions) and Section 3.3.2; and further referenced in discussions throughout Sections 5 and 7
Other subject vehicles can be volunteers	2453-B:2(7)	House Revenue Comm. (May 2013)	Stated in Section 1.3 (Definitions) and Section 3.3.2; and further referenced in discussions throughout Sections 5 and 7 (including a "volunteer" scenario)
Lessee to pay RUC for term of lease only	2453-B:3(1)(b)		Stated in Section 1.3 (Definitions) and Section 5.2.3
Flat annual RUC available in lieu of metered RUC - based on 35,000 miles times rate	2453-B:4(1)	Re-affirmed at Sept 2013 meeting	Addressed in Sections 3.3.2, 4 (Needs and Objectives) and 5.2.2.3. Also included in Section 7 in multiple scenarios.
For-hire carriers as defined in ORS 825.005 cannot choose flat annual RUC	2453-B:4(2)		Addressed in 5.2.2.3
ODOT must establish / have methods to ID RUC vehicles and record / report miles	2453-B:6(2)(a)	October 2011 meeting	Opening sentence to Section 5.2.2.1 - Mileage Reporting Approaches. Also a scenario on Section 7
In establishing methods in 6(2)(a), the Department must consider data accuracy; driver privacy; tech security and resistance to tampering; audit and compliance	2453-B:6(2)(b)		Specifically listed in Section 3.2.2 and 5.2.2.1. Also, these various considerations are discussed in greater detail in Section 6
One available method of recording / reporting must not include vehicle location tech	2453-B:6(2)(c)	October 2011 meeting	Specifically stated in Sections 3.2.2 and 5.2.2.1
Dept to adopt standards for open system tech; must collaborate with other agencies to integrate systems currently in use or planned for use	2453-B:6(2)(d)		The requirement of an "open system" is a recurring theme, with specific discussions in Section 1.3 (Definitions), Section 3.3.2, and Section 6.1
Persons liable for RUC must be provided choice for collecting / reporting mileage	2453-B:6(3)		A recurring theme throughout (e.g., vision and goals). Specific discussions in Section 5.2.2 and the scenarios in 7.2

Policy requirement	HB 2453 reference (section of bill)	RUFTF reference (policy statement)	Corresponding system element as described in RUC CONOPS (to be updated)
Department must provide a form/application for applicants who wish to pay RUC as volunteer participants	2543-B:6a(1)		Addressed in Section 5.2.1, and as a scenario in Section 7.2.3
Volunteers must be equipped with a reporting method as described in Section 6	2453-B:6a(2)(b)		Addressed in Section 5.1
Limit of 5,000 volunteers	2453-B:6a(2)(d)		Addressed in Sections 3.3.2, 5.2.1, and scenario in Section 7.2.3
Volunteers may withdraw at any time by providing notice and paying outstanding RUC	2453-B:6a(4)		Addressed in Section 5.2.4
Dept shall provide rules for RUC collection, including penalties and interest	2453-B:7		Addressed in Section 6.5
Dept shall establish by rule reporting periods	2453-B:8(1)		Addressed in Section 5.2.3.2
When establishing reporting periods, Dept shall consider effort by owners to use and pay RUC; amount of RUC owed; and admin cost to Dept	2453-B:8(3)		Addressed in Section 5.2.3.2
Personally Identifiable Information (PII) is confidential	2453-B:9(2)		Stated in Section 6.6
Dept or CSP cannot disclose PII to any person except certain parties listed in bill specific to that party's function in the RUC	2453-B:9(3)(a) and (b)		Stated in Section 6.6
Dept and CSPs shall destroy records of location and daily metered use within 30 days after payment processing or conclusion of dispute resolution	2453-B:9(4)(a)		Stated in Section 6.6
Aggregate info may be retained by Dept and CSP after removing PII, monthly summaries may be retained	2453-B:9(4)(b)(A) and (C)		Stated in Section 6.6
CSP may retain PII if owner / lessee consents to retention	2453-B:9(4)(b)(B)		Stated in Section 6.6
As soon as applicable, person shall notify Dept that he owns or leases a subject vehicle, and choose a reporting and payment method (including flat annual RUC)	2453-B:10(1)		Discussed in Section 5.2.1, with various related scenarios in Section 7.2

Policy requirement	HB 2453 reference (section of bill)	RUFTF reference (policy statement)	Corresponding system element as described in RUC CONOPS (to be updated)
Dept to assume all reported miles accrued on Oregon highways unless owner presents evidence otherwise – Dept to establish rule	2453-B:10(3)		Footnote in Section 5.2.2.1
Volunteers may not opt for flat annual RUC	2453-B:10a(2)		Addressed in Section 5.2.2.3
Dept to assume all reported miles accrued on Oregon highways unless volunteer participant presents evidence otherwise – rule to be established by ODOT	2453-B:10a(3)		Footnote in Section 5.2.2.1
Dept shall provide refund of overpaid RUC, can provide by rule that refund is credited to future charges	2453-B:11		Addressed in Section 6.3.3
Dept shall provide process and form for RP to apply / receive overpaid RUC	2453-B:12		Addressed in Section 6.3.3
Dept may investigate RUC refund applications, may examine relevant records	2453-B:13		Addressed in 6.5.3
Upon application, Dept will provide refund of gas tax and use fuel tax to RUC payer if RUC has been paid; credit against future RUC can be used by Dept by rule	2453-B:16 and 17		Discussed in Section 6.2.2
Dept may provide refund thresholds to limit # of small refunds claimed	2453-B:17(4)		Not addressed
Defines tampering, establishes violation classification	2453-B:19		Addressed in Section 6.5.2
Dept / OIPP can enter into agreement for RUC tech and operations	2453-B:23		Addressed in Section 6.7