Institute of Transportation Studies, UC Davis

Designing a road-usage charge program for California

A comprehensive analysis on rate-setting, administrative costs estimates, and vehicle-miles travelled

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Introduction

Transportation funding in the United States has historically been supported by motor fuel taxes. In 2021, the federal motor fuel tax raised about $32.8 billion in revenue which accounted for about 70% of the Federal Highway Trust Fund's expenditures on infrastructures[1]. With the increasing uptakes of alternative fuels vehicles, improved vehicles fuel efficiencies, and inflation, the revenues generated by the motor fuel taxes are projected to dwindle, creating shortfalls in the federal infrastructure funding[2]. This is not only a concern at the federal level, as many states have explored ways to address the widening gap between transportation funding availability and needs. In 2017, California passed the Road Repair and Accountability Act (Senate Bill 1) that increased the tax rates on gasoline and diesel. The bill also introduced an annual registration fee of $108 on zero-emission vehicles to compensate for the fact that these vehicles do not contribute to road infrastructure funding via traditional fuel taxes[3]. While many other states have also begun to enforce registration fees on electric vehicles (EVs), this form of revenue is often viewed as a stopgap measure, since it is indirectly linked to the amount of driving by the vehicle being taxed.

In 2021, California passed Senate Bill 339 to require the formation of a Road Usage Charge (RUC) Technical Advisory Committee to guide the development and evaluation of a pilot program to assess the potential of replacing motor fuel taxes with a mileage-based fee. As part of this effort, the Technical Advisory Committee along with the Institute of Transportation Studies at UC Davis (UCD) conducted the analysis on the following areas to inform the design and implementation of the statewide RUC pilot, including 1) compiling examples of the road charge rates used by other states, 2) devising RUC rates for medium- and heavy-duty commercial vehicles, 3) estimating vehicle-miles travelled (VMT) for light-, medium- and heavy-duty vehicles, and 4) estimating the administrative costs associated with implementing a RUC. This report presents findings on the abovementioned areas in hopes of advancing the Technical Advisory Committee's understandings on these issues and aiding the implementation of the RUC pilot.

Task 1: Compile and summarize RUC rate methodologies used by other states

Literature Review

We reviewed Road User Charge (RUC) reports from the states that have either implemented a pilot or a full-scale program, including California, Colorado, Hawaii, Minnesota, Oregon, Utah, Washington, and the Eastern Transportation Coalition, which encompasses Delaware, New Jersey, North Carolina, and Pennsylvania. From these reports, we synthesized each state's RUC rates and considerations that went into the rate-setting process. Some of the most considered factors in RUC rate-setting methodologies included state-level motor fuel tax rates, vehicle fuel efficiency, and annual VMT. The proposed revenue streams covered by RUC take both the revenues from motor fuel taxes (revenue neutrality considerations) and the requirements of infrastructure bonds into account. Equity considerations are at the forefront of RUC rate-setting among these states, especially quantifying the financial impacts on drivers of different incomes, geographies (e.g., rural vs. urban drivers), and vehicle technologies (e.g., internal combustion engine vehicles vs. zero-emission vehicles).

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[1] https://www.fhwa.dot.gov/policyinformation/statistics/2021/pdf/fe210.pdf
[2] Jenn, A. (2020). Federal Road Charge Tax Administration Process. https://doi.org/10.7922/G22805WD
[3] https://dot.ca.gov/-/media/dot-media/programs/research-innovation-system-information/documents/caltrans-fact-booklets/2022-caltrans-factsv2-a11y.pdf

Key takeaways

- The RUC rate-setting methodologies among states have been a revenue-neutral rate with the gasoline tax
- Some states have taken VMT into account when setting RUC rates for their pilot projects, such as Minnesota and Washington
- Future RUC rate-setting should address equity by varying rates among income groups, geographies (rural vs. urban), and vehicle weights
- Other considerations being used or tested by states include capping RUC payments and providing credits that can be used to offset future RUC payments
- Potential ways to reduce administrative costs include integrating manual odometer reading into existing vehicle inspections/ registrations or collaborating with the tolling industry to reduce collection costs

Summary Findings from State RUC Pilots

Washington (pilot conducted from 2018 to 2019)[4]

Rate Setting Methodologies

Washington has $7 billion in outstanding or soon-to-be-issued highway construction bonds that would need to be paid via revenue generated from the gasoline tax. As a result, the gasoline tax would need to be in place for at least another 10 years. The state believes that RUC implementation can co-exist with the gasoline tax, as long as participants are refunded the gasoline tax that they pay at the pump. To ensure fairness, the state contemplates that more fuel-efficient vehicles should receive a lower gas tax credit (as they refuel less), while less fuel-efficient vehicles receive a higher gas tax credit. During their pilots, Washington projected costs of RUC to each vehicle based on scenarios of a different number of total vehicles enrolled in the program. Fuel efficiency and annual VMT changes were used to estimate the financial impacts of transitioning from gasoline tax to RUC.

For out-of-state travelers, until a RUC system is more widely adopted throughout the Pacific Northwest region, the most cost-effective way to collect RUC is to continue paying the gas tax. The pilot project tested both pre- and post-pay approaches to RUC. Pre-pay approach involved a mileage permit. There was also research done on a time permit approach which would charge drivers a flat rate for the use of roads. The time permit rate is determined by estimating the mileage equivalent a driver is estimated to drive during that period and then multiplying that by the per-mile rate. Currently, Washington considers three scenarios for implementation: 1) introduce RUC for only electric vehicles in 2023, 2) introduce RUC gradually by MPG rating, including those above 20 MPG, over the course of a decade, and 3) introduce RUC for all new vehicles in 2025.

[4]https://waroadusagecharge.org/wp-content/uploads/2020/01/WSTC-Final-Report-Vol-1-WEB-2020_01.pdf

Revenue streams covered

The estimates of RUC rates are based on the equivalent revenue coming from the gasoline tax, including the revenue requirements of the outstanding bonds sold based on increasing gas tax revenue.

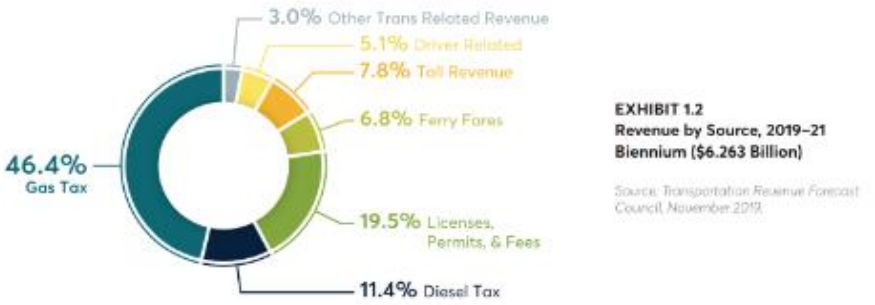

Figure 1. Sources of Washington's transportation infrastructure revenue.

Equity Considerations

There is future direction to investigate a RUC rate that varies by vehicle weight, emissions (gas guzzlers or not), drivers' location, and drivers' income. Below is a scenario analysis on the impacts of RUC on rural vs. urban drivers using average annual VMT. On average, the changes in financial impacts to rural and urban drivers is on the order of 2%, with rural drivers potentially benefit from RUC.

EXHIBIT 2.3
Comparison of a Fuel Tax With a Hypothetical Road Usage Charge—Calendar Year 2014

Comparison by Geography	Average Annual: VMT (miles)	Fuel Consumed (gallons)	Fuel Tax Paid ($, Current Law)	Road Usage Charge ($, Hypothetical Scenario)	Impact of Change to Hypothetical Scenario ($)
Rural	9,288	484	$182	$178	-$4
Urban	8,611	436	$163	$165	+$2

Note: Model data sources include June 2014 DOL VHS data, EPA fuel economy estimates for 1984–2014, 2011–13 WSDOT HPMS, and the 2009 NHTS.
Source: Excerpt from Table 5, Appendix A-20.

Figure 2. An estimate of impacts of RUC on rural vs. urban drivers based on historical VMT and fuel consumption data in 2014.

Administrative Costs

The estimated administrative costs of a RUC program using the manual odometer reporting option was about 7% and 12% for the electronic odometer reading device, respectively. A financial clearing house was established for Washington and Oregon, and it successfully processed the submittal of miles driven in each state. RUC payments were collected from a small group of RUC pilot participants who travelled between Washington and Oregon. The costs associated with operating a clearing house are summarized in Figure 3 below.

Category	Startup Expenses	Ongoing Operating Expenses (annualized)
Clearinghouse Expenses		
Office Rent or Mortgage costs	$45,000	$62,000
Transactional costs		$139 per transaction per state[5]
Database/IT maintenance	$ 8,000,000[6]	$148,000
Administrative staffing		$700,000
Audit costs for the clearinghouse (external to state costs)		$10,000
Participating State Expenses (expenses apply to each participating jurisdiction)		
Administrative support costs within each state		$59,317.79
Database/IT maintenance within each state	$500,000 - $1,500,000	$8,400
Audit function costs within each state		$11,863.56

Figure 3. Ongoing operating and maintenance costs are a major component of interstate financial clearing house.

Oregon (pilot conducted in 2015 to 2017)[5]

Rate-setting methodologies and interoperability

The current rate is 1.8 cents/mile, which is revenue-neutral with motor fuel taxes revenues and the average fuel efficiency of the Oregon light-duty vehicle fleet. The major revenue generators of the Oregon State Highway Fund include the Driver and Motor Vehicle fees, motor carrier fees, and fuel taxes. Out of these funding streams, the state-level fuel taxes generate the most revenue at around $520 million in 2015. In the pilots, Oregon studied the feasibility of a connected vehicle ecosystem, where the mileage data is directly collected from the vehicles with the goal of lowering administrative costs. This would further facilitate a financial clearinghouse or interoperability hub model would be best suited for RUC. Under this model, each state can have different technologies and back offices, but they coordinate interstate travel such that the drivers would pay for their RUC payments to their home state only. Oregon is also interested in explored opportunities to collaborate with tolling agencies in Oregon who are more experienced in collecting and managing vehicle-level data and managing customer service centers.

Some equity considerations that the pilots considered include converting refunds of excess fuel taxes to non-refundable credits against future RUC charges. This would help alleviate potential financial burdens of RUC on financially disadvantaged drivers. Exempting vehicles with ratings of at least 40 MPG from paying enhanced registration surcharge fee when they pay RUC would also ensure fairness and avoid double-charging.

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[5] https://www.oregon.gov/odot/Programs/RUF/RUFTF%20REPORT%202017.pdf & https://www.oregon.gov/odot/Programs/RUF/RUFTF_REPORT_2021.pdf

Hawaii (pilot conducted from 2018 to 2021)[6]

Rate-setting methodologies

Hawaii customized driving reports to reflect the distance driven by vehicle owners between their two most recent inspections. The pilot outreached to 360,000 vehicle owners. From their outreach, they decided on the approach of setting a revenue-neutral rate with gasoline tax at 0.8 cents/mile. Future rate-setting would like to take vehicle weight into consideration (e.g., having a separate RUC rate for light-duty vs. medium- and heavy-duty vehicles). Integrating the RUC program into the mandatory annual vehicle inspection to reduce administrative costs. Hawaii identified the need of $30.2 billion for state-owned transportation improvements from 2014 to 2035 which is important in designing future RUC rates. Federal, state, and county revenue expects to generate $7 billion, leaving the state with a funding gap of $23.9 billion.

Equity considerations

During their statewide outreach, Hawaii identified that the majority of early adopters of EVs are higher-income households who are more financially able to transition from the gas tax to RUC. Because of the makeup of EV drivers, the state recommends transitioning the $50 annual flat fee for electric vehicles to a per-mile rate of 0.8 cents/mile with a cap of $70 per year. This would allow the EV drivers to pay a fair share for their use of the transportation infrastructures while minimizing the regressivity of such payment. Due to the unique geography of Hawaii being an island, future research of RUC implementation on rental car fleets is essential to understand how they can equitably contribute to the revenue generation.

Colorado (pilot conducted from 2016 to 2017)[7]

Rate-setting methodologies

The rate was set to be revenue-neutral with a gasoline tax, assuming the average MPG of the state's vehicle fleet. The revenue-neutral rate is set at 1.2 cents/ mile in the pilot project. Colorado identified that the initial implementation of RUC should be a revenue-neutral rate with the gasoline tax, with potential future improvements to vary rates by vehicle weights etc. The state considers incorporating administrative costs as part of the RUC rate-setting. One of the equity considerations include accounting for vehicle MPG and driver geographies in recruiting participants, so the pilot can provide insights into the impacts of RUC on different populations.

[6] https://hiruc.org/hiruc-final-report-flipbook/

[7] https://www.codot.gov/programs/ruc/documents/final-survey-report

Utah (statewide program began implementation in 2020)[8]

Rate-setting methodologies

Utah adopts a revenue-neutral RUC rate with the gasoline tax, computed at the average MPG of the vehicle fleet and indexed to inflation. The current fleet average MPG is 20 MPG. The RUC covers the revenues from the gasoline tax.

Equity considerations

To reduce the financial burden on drivers of plug-in electric vehicles (PEVs), the annual RUC fee is capped at the annual flat fee schedule. Rural drivers in Utah are likely to pay less under RUC because they tend to drive less fuel-efficient vehicles.

Administrative costs

Learning-by-doing and creating a competitive market for account managers to bid for RUC implementation could reduce administrative costs.

California (pilot conducted from 2016 to 2017)[9]

Rate-setting methodologies

The pilot set a revenue-neutral RUC rate with 5-year average gasoline tax rates, computed at the average MPG of the entire CA fleet. It was set at 1.8 cents/mile. A separate RUC rate is computed for heavy-duty vehicles that run on diesel. RUC covers the equivalent of gasoline and diesel taxes revenues.

Equity considerations

The pilot specifically focused on the impacts of RUC on lower-income households who may drive older and less fuel-efficient vehicles and on rural vs. urban drivers.

Administrative costs

There is potential to integrate manual mileage reporting with smog checks to reduce administrative costs. However, this does not include ZEVs and vehicles newer than 8 years. The estimated range of administrative costs is in the range of 5-10% of revenues, which is similar to those of natural gas and electric utilities companies.

[8] https://le.utah.gov/interim/2021/pdf/00002250.pdf
[9] https://caroadcharge.com/media/htbpngos/rcpp-final-report-a11y.pdf

Minnesota (pilot conducted from 2021 to 2022)[10]

Rate-setting methodologies

The RUC rate accounted for both the state and federal motor fuel taxes, and it is 2.7 cents/mile. The revenue generated from RUC is the equivalent of motor fuel taxes revenues. The pilot considered fleet-based vehicles in the rate-setting because they make up a large percentage of trucks in the U.S.

- State RUC rate = state fuel taxes revenue / total state VMT
- Federal RUC rate = federal fuel taxes revenue / total federal VMT

Equity considerations

Some equity considerations include that the RUC rate should be adjustable based on household income, vehicle weight, and time-of-day of travel. To account for wear-and-tear from heavier vehicles, the additional charge range from 0.02 cents/mile to 0.07 cents/mile for cars to semi-trucks.

Administrative costs

The reduction in collection points reduces administrative costs of RUC.

Eastern Transportation Coalition (pilot conducted from 2018 to 2022)[11]

Summary

The Eastern Transportation Coalition (TETC) began its exploration of mileage-based user fee (MBUF) in 2018 by leveraging a two-prong approach to conduct pilots with commercial trucks and private passenger vehicles. The national truck pilot recruited 221 vehicles that travelled across 48 states. Meanwhile, the passenger vehicle pilot project encompassed 383 drivers from Delaware, New Jersey, North Carolina, and Pennsylvania. By conducting pilot projects on both commercial trucks and private passenger vehicles, TETC aims to investigate the challenges associated with implementing a MBUF to replace motor fuel in a multi-state environment, while synthesizing lessons learned for future MBUF implementation.

Rate-setting methodologies

For the national truck pilot, tiered rates were implemented based on four MPG ranges. Future rate settings for trucks should account for vehicle weights. For the passenger vehicle pilot, the revenue-neutral rate was computed by dividing the state fuel taxes revenue by the national fuel economy average: 23 MPG. A tiered rate-setting approach was also considered for passenger vehicles. The current RUC rate-setting methodologies are based on the recovery of the state-level motor fuel revenues for Delaware, New Jersey, North Carolina, and Pennsylvania.

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[10] https://dbf.dot.state.mn.us/media/final_report_2022/Minnesota%20Distance-Based%20Fees%20Project%20Final%20Report%20August%202022.pdf

[11] https://tetcoalitionmbuf.org/wp-content/uploads/2022/02/Exploration-of-Mileage-Based-User-Fee-Approaches-for-All-Users_Condensed-1.pdf

Equity considerations

Financial impacts of revenue-neutral RUC were estimated by classifying households in Delaware, New Jersey, North Carolina, and Pennsylvania into five geographic classes, analyzing each class's travel behavior and their vehicle fleet. Travel behavior estimation conducted on the Local Area Transportation Characteristics for Households (LATCH) dataset from the U.S. Bureau of Transportation Statistics. Rural and mixed geographic drivers may pay less with RUC than gasoline tax, while most drivers would be minimally impacted, amounting to about an annual increase or decrease of $18. Tiered RUC rates based on MPG ranges introduced drastic differences in RUC payments for trucks that fall into one category vs. the other.

Administrative costs

TETC Conducted pilot to test account management integration with tolling agencies to consolidate account creation, invoicing, and customer service.

Task 2: Research current commercial vehicle fuel taxes and fees and provide recommendations on future RUC rates

a) Develop a list of commercial vehicle companies, types, weights, ranges of MPGs, & amounts

Table 1. Commercial vehicles in California by weight class, ranges of MPGs, and amounts in 2021

Gross vehicle weight categories	Vehicle Class (FHWA)	Vehicle class (CARB)	Weights	MPG[12]	Amounts (in thousands)[13]
Light-duty	Class 1	LDT 1/2	less than 6,000 lbs.	22	2,657
	Class 2	MDV and LHD1	6,001 to 10,000 lbs.	20	1,131
Medium-duty	Class 3	LHD2	10,001 to 14,000 lbs.	14	83
	Class 4	Class 4	14,001 to 16,000 lbs.	8	40
	Class 5	Class 5	16,001 to 19,500 lbs.	8	46
	Class 6	Class 6	19,501 to 26,000 lbs.	8	88
Heavy-duty	Class 7	Class 7	26,001 to 33,000 lbs.	6	32
	Class 8	Class 8	greater than 33,000 lbs.	6	280

b) Research the fuel taxes and fees commercial vehicles pay annually

[12] https://ww2.arb.ca.gov/sites/default/files/2021-03/emfac2021_volume_3_technical_document.pdf and https://www.eia.gov/outlooks/aeo/pdf/AEO2022_ChartLibrary_Transportation.pdf

[13] U.S. Census Bureau. (2021). In-use vehicles by registration state, business use, and body type for the U.S. https://data.census.gov/table?q=vius212c&g=010XX00US,$0400000&tid=VIUSC2021.VIUS212C&nkd=PRICHAR~15

Table 2. The types of federal fuel taxes and fees applicable to commercial vehicles in California

Types of Fees	Vehicle classification	Who does it apply to?	Amount	Sources
Federal				
Heavy Vehicle Use Tax (HVUT)*	Below 55,000 lbs.	heavy vehicles operating on public highways	$0	https://www.fhwa.dot.gov/policy/091116/pdfs/fhwatri-fold.pdf
	55,000 to 75,000 lbs.		$100 plus $22/1000 lbs. over 55,000 lbs. annually	
	Over 75,000 lbs.		$550/year	
Federal Motor Vehicle Fuel (Gasoline) Tax	Excise Tax	all vehicles that run on gasoline	$0.18/gallon	https://www.eia.gov/tools/faqs/faq.php?id=10&t=5
Federal Diesel Tax	Excise Tax	all vehicles that run on diesel	$0.24/gallon	https://www.eia.gov/tools/faqs/faq.php?id=10&t=5
Federal Tire Tax	Weight of tires	Trucks	For tires over 40-lb weight, $0.15/ pound up to $10.5 For tires over 90-lb weight, $0.50/ pound	https://www.dgs.ca.gov/Resources/SAM/TOC/3500/3585
Unified Carrier Registration	Bracket 1: 0-2 vehicles	Motor carriers involved in interstate commerce	$59/year	https://www.federalregister.gov/documents/2022/01/24/2022-01022/fees-for-the-unified-carrier-registration-plan-and-agreement
	Bracket 2: 3-5 vehicles		$176/year	
	Bracket 3: 6-20 vehicles		$351/year	
	Bracket 4: 21-100 vehicles		$1224/year	
	Bracket 5: 101-1000 vehicles		$5835/year	
	Bracket 6: over 1000 vehicles		$56,977/year	

Heavy vehicle use tax: The heavy vehicle use tax (HVUT) is based on the unloaded weight of the truck. The federal Highway Administration (FHWA) conducts HVUT compliance reviews once every three years. HVUT fees go into the Federal Highway Trust Fund.

Federal gasoline tax[14]: Out of the revenue collected from federal gasoline tax, approximately 84% goes into the Federal Highway Trust Fund, while the remaining 16% goes to the Mass Transit Account.

Federal diesel tax: Out of the revenue collected from federal diesel tax, approximately 88% goes into the Federal Highway Trust Fund, while the remaining 12% goes into the Mass Transit Account.

Federal tire tax: All the revenues collected from the federal tire tax goes into the Federal Highway Trust

[14] https://www.fhwa.dot.gov/fastact/factsheets/htffs.cfm

Fund.

Table 3. The types of state fuel taxes and fees applicable to commercial vehicles in California. Pursuant to Senate Bill 1, the gasoline and diesel taxes are indexed to inflation each year, so the amount of the excise tax changes each year in order to close revenue gaps. Caltrans budgets the SB 1 increases separately.

Types of Fees	Vehicle classification	Who does it apply to?	Amount	Sources
State of California				
California Motor Vehicle Fuel (Gasoline) Tax	Excise Tax	all vehicles that run on gasoline	$0.57/gallon	https://www.cdtfa.ca.gov/taxes-and-fees/sales-tax-rates-for-fuels.htm
	Sales Tax		2.25% plus applicable local sales tax rate*	
California Diesel Tax	Sales Tax	all vehicles that run on diesel	13% plus applicable local sales tax rate	https://www.cdtfa.ca.gov/taxes-and-fees/sales-tax-rates-for-fuels.htm
	Excise Tax		$0.44/gallon	
California Weight Fees	Class A (10,001 to 15,000 lbs.)	Commercial vehicles over 10,001 pounds, registered in California	$332/year	https://www.dmv.ca.gov/portal/uploads/2020/05/reg4008.pdf
	Class B (15,001 to 20,000 lbs.)		$447/year	
	Class C (20,001 to 26,000 lbs.)		$546/year	
	Class D (26,001 to 30,000 lbs.)		$586/year	
	Class E (30,001 to 35,000 lbs.)		$801/year	
	Class F (35,001 to 40,000 lbs.)		$937/year	
	Class G (40,001 to 45,000 lbs.)		$1028/year	
	Class H (45,001 to 50,000 lbs.)		$1161/year	
	Class I (50,001 to 54,999 lbs.)		$1270/year	
	Class J (55,000 to 60,000 lbs.)		$1431/year	
	Class K (60,001 to 65,000 lbs.)		$1562/year	
	Class L (65,001 to 70,000 lbs.)		$1701/year	
	Class M (70,001 to 75,000 lbs.)		$2004/year	
	Class N (75,001 to 80,000 lbs.)		$2064/year	

Gasoline excise tax[15]: Upon investigating the uses of California's state gasoline excise taxes, we identified the following sources and percentages. Approximately 50% of the state gasoline excise taxes goes into the State Highway Account and is used to pay for state highway maintenance, rehabilitation, and related administration. The second largest use is towards cities and counties in California to support their streets and roads, which accounts for about 32% of revenue generated from the state gasoline excise taxes. Lastly, about 18% of the revenue is directed to the Road Maintenance and Rehabilitation Account, established under Senate Bill 1 (SB 1). Roughly $380 million of the SB 1 gasoline excise tax revenues are used for transportation-related programs, such as active transportation, bridge and culvert repairs, and transportation research. Of the remaining $1.5 billion in the account, half stays within it to fund state highway maintenance

[15] https://lao.ca.gov/Transportation/FAQs

and rehabilitation, while the other half is provided to cities and counties for their streets and roads.

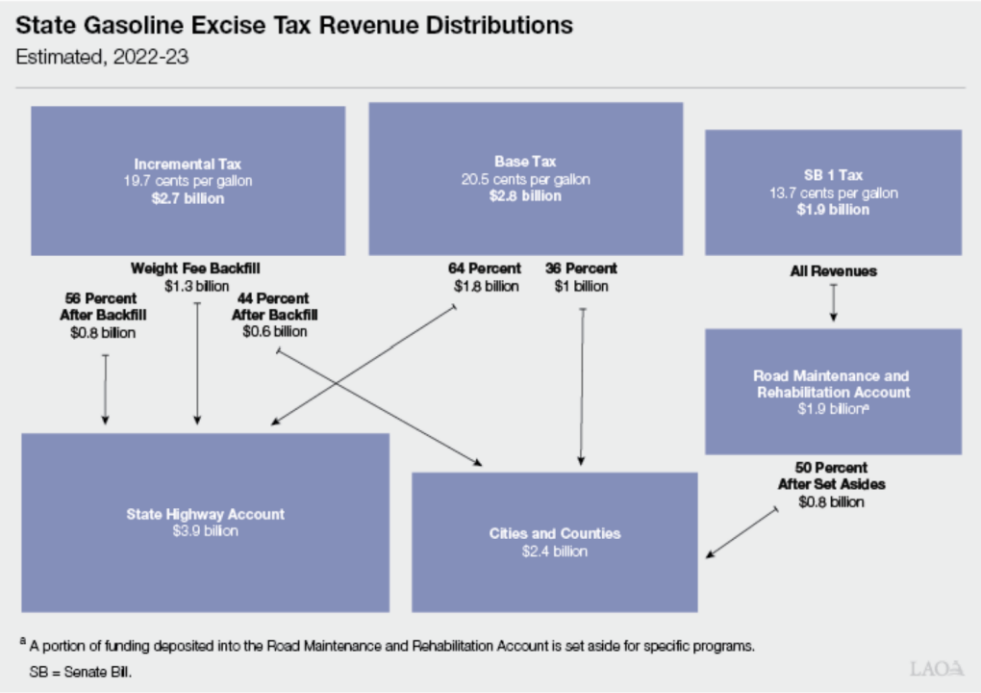

Figure 4. The breakdown of state gasoline excise taxes and their uses from 2022 to 2023.

Diesel excise tax[16]: The revenue collected from excise diesel taxes is deposited into the State Transportation Fund, and it is used for the construction and maintenance of public roads and transit systems.

Weight Fees[17]: The Weight Fee Swap of 2011 redirected all weight fees to the Transportation Debt Service Fund (TDSF) for transportation debt service payments and General Fund loans. In return, the SHA receives monthly backfill payments, from the incremental excise tax (formerly the price-based excise tax), equal to the sum of weight fees that were redirected from the account.

c) Estimate future diesel and gasoline excise taxes revenues in California

To estimate future diesel and gasoline excise taxes revenues, we leveraged outputs from the California Emissions Factors Model (EMFAC) to compute VMT by diesel and gasoline separately. EMFAC projects VMT to 2030, which we applied to estimate the diesel and gasoline taxes revenues, separately. We also leverage the fuel efficiency data of vehicles of different classes from the Alternative Fuels Data Center to complete our estimates of the revenues. See Equation 1 and 2 below for the details of our computations of diesel and gasoline excise taxes, respectively. Table 4 and 5 below present the results of the estimated diesel excise and gasoline excise taxes

[16] https://advocacy.calchamber.com/policy/issues/californias-gas-tax/#:~:text=Diesel%20fuel%20taxes%20generated%20%241.269,systems%2C%20airports%2C%20and%20waterways.
[17] https://dot.ca.gov/-/media/dot-media/programs/budgets/documents/fiscal_year_2023-24_california_transportation_financing_package_signed-a11y.pdf

revenues from 2020 to 2030, respectively.

$$Diesel\ excise\ taxes\ revenue = \frac{VMT\ by\ diesel\ by\ vehicle\ class}{fuel\ efficiency\ by\ vehicle\ class} \cdot diesel\ excise\ tax\ rate \quad (1)$$

$$Gasoline\ excise\ taxes\ revenue = \frac{VMT\ by\ gasoline\ by\ vehicle\ class}{fuel\ efficiency\ by\ vehicle\ class} \cdot gasoline\ excise\ tax\ rate \quad (2)$$

Table 4. Annual revenue from diesel excise taxes ($) from 2020 to 2030.

Vehicle Class	Vehicle category	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
LDT 1[18]		9.83E+04	1.01E+05	8.97E+04	7.93E+04	7.01E+04	6.17E+04	5.12E+04	2.53E+04	1.58E+04	8.85E+03	3.73E+03
LDT 2		4.64E+06	5.66E+06	6.03E+06	6.33E+06	6.58E+06	6.76E+06	6.91E+06	7.04E+06	7.16E+06	7.26E+06	7.35E+06
LHD 1[19]		9.98E+07	1.15E+08	1.17E+08	1.18E+08	1.18E+08	1.17E+08	1.15E+08	1.14E+08	1.12E+08	1.09E+08	1.07E+08
MDV[20]	Light-duty	1.82E+07	2.10E+07	2.10E+07	2.09E+07	2.06E+07	2.02E+07	1.97E+07	1.92E+07	1.87E+07	1.82E+07	1.77E+07
LHD 2		5.40E+07	6.35E+07	6.56E+07	6.73E+07	6.82E+07	6.86E+07	6.87E+07	6.86E+07	6.81E+07	6.75E+07	6.65E+07
Class 4		3.28E+07	3.32E+07	3.36E+07	3.41E+07	3.44E+07	3.47E+07	3.48E+07	3.49E+07	3.47E+07	3.43E+07	3.37E+07
Class 5		6.29E+07	6.37E+07	6.46E+07	6.55E+07	6.63E+07	6.68E+07	6.72E+07	6.73E+07	6.70E+07	6.62E+07	6.50E+07
Class 6	Medium-duty	6.96E+07	7.06E+07	7.15E+07	7.25E+07	7.34E+07	7.39E+07	7.44E+07	7.45E+07	7.42E+07	7.35E+07	7.22E+07
Class 7		8.99E+07	9.07E+07	9.21E+07	9.28E+07	9.39E+07	9.47E+07	9.55E+07	9.60E+07	9.63E+07	9.62E+07	9.58E+07
Class 8	Heavy-duty	1.05E+09	1.07E+09	1.09E+09	1.11E+09	1.13E+09	1.15E+09	1.17E+09	1.18E+09	1.20E+09	1.21E+09	1.22E+09

Table 5. Annual revenue from diesel sales taxes ($) from 2020 to 2030.

Vehicle Class	Vehicle category	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
LDT 1		1.06E+05	1.33E+05	1.72E+05	1.35E+05	1.14E+05	1.00E+05	8.31E+04	4.10E+04	2.56E+04	1.44E+04	6.06E+03
LDT 2		4.99E+06	7.49E+06	1.16E+07	1.08E+07	1.07E+07	1.10E+07	1.12E+07	1.14E+07	1.16E+07	1.18E+07	1.19E+07
LHD 1		1.07E+08	1.53E+08	2.24E+08	2.01E+08	1.91E+08	1.89E+08	1.87E+08	1.85E+08	1.81E+08	1.78E+08	1.74E+08
MDV	Light-duty	1.96E+07	2.78E+07	4.03E+07	3.56E+07	3.34E+07	3.27E+07	3.19E+07	3.11E+07	3.03E+07	2.95E+07	2.88E+07
LHD 2		5.81E+07	8.41E+07	1.26E+08	1.15E+08	1.11E+08	1.11E+08	1.11E+08	1.11E+08	1.11E+08	1.09E+08	1.08E+08
Class 4		3.53E+07	4.39E+07	6.45E+07	5.81E+07	5.59E+07	5.62E+07	5.65E+07	5.66E+07	5.63E+07	5.57E+07	5.46E+07
Class 5		6.76E+07	8.44E+07	1.24E+08	1.12E+08	1.08E+08	1.08E+08	1.09E+08	1.09E+08	1.09E+08	1.07E+08	1.05E+08
Class 6	Medium-duty	7.49E+07	9.34E+07	1.37E+08	1.24E+08	1.47E+08	1.48E+08	1.49E+08	1.49E+08	1.48E+08	1.47E+08	1.44E+08
Class 7	Heavy-duty	8.93E+07	1.11E+08	1.63E+08	1.46E+08	1.14E+08	1.15E+08	1.16E+08	1.17E+08	1.17E+08	1.17E+08	1.17E+08

[18]LDT: Light-duty truck
[19]LHD: Light-and-heavy-duty truck
[20] MDV: Medium-duty vehicles

Class 8		1.13E+09	1.41E+09	2.09E+09	1.89E+09	1.83E+09	1.86E+09	1.89E+09	1.92E+09	1.94E+09	1.96E+09	1.98E+09

Table 6. Annual revenue from gasoline excise taxes ($) from 2020 to 2030.

Vehicle Class	Vehicle category	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
LDA[21]	Light-duty	3.42E+09	3.92E+09	3.93E+09	3.93E+09	3.92E+09	3.88E+09	3.85E+09	3.84E+09	3.82E+09	3.81E+09	3.80E+09
LDT 1		3.96E+08	4.47E+08	4.40E+08	4.33E+08	4.24E+08	4.13E+08	4.03E+08	3.95E+08	3.87E+08	3.80E+08	3.73E+08
LDT 2		1.81E+09	2.14E+09	2.22E+09	2.28E+09	2.34E+09	2.38E+09	2.41E+09	2.45E+09	2.48E+09	2.51E+09	2.54E+09
LHD 1		1.78E+08	2.05E+08	2.07E+08	2.09E+08	2.09E+08	2.07E+08	2.06E+08	2.04E+08	2.01E+08	1.97E+08	1.93E+08
MDV		1.35E+09	1.57E+09	1.60E+09	1.62E+09	1.63E+09	1.63E+09	1.63E+09	1.63E+09	1.63E+09	1.64E+09	1.64E+09
LHD 2	Medium-duty	3.67E+07	4.18E+07	4.19E+07	4.18E+07	4.14E+07	4.08E+07	4.01E+07	3.93E+07	3.84E+07	3.75E+07	3.65E+07

d) Develop road charge recommendations for California commercial vehicles

After estimating the annual revenues of diesel and gasoline excise taxes, we computed the revenue-neutral RUC rates for diesel and gasoline vehicles across all vehicle classes.

Table 7. Revenue-neutral RUC rates for diesel and gasoline taxes in 2023

Vehicle Class	Category	Gasoline RUC rate ($/mile)	Diesel RUC rate ($/mile)
LDA	Light-duty	0.02	NA
LDT 1		0.03	0.05
LDT 2		0.03	0.05
LHD 1		0.03	0.06
MDV		0.03	0.06
LHD 2	Medium-duty	0.04	0.09
Class 4		NA	0.15
Class 5		NA	0.15
Class 6		NA	0.15
Class 7	Heavy-duty	NA	0.19
Class 8		NA	0.20

[21] LDA: Light-duty passenger vehicles

- The revenue-neutral diesel RUC rates for medium- and heavy-duty are higher than gasoline RUC rates due to the vehicles' lower fuel efficiency and sales tax revenues of diesel.
- Certain light-duty vehicle classes (e.g., LDT 1, LDT 2, LHD 1, and MDV) drive on both gasoline and diesel. It is important to distinguish whether these light-duty vehicles drive on diesel, gasoline, or both in order to fairly charge them a revenue-neutral RUC rate.
- Weight fees associated with commercial vehicles heavier than 10,001 pounds may account for some of the wear-and-tear that they pose on roadways.
- Further research is needed to identify the portion of weight fees going towards road maintenance and repairs in order to determine commercial vehicles' current contribution to transportation infrastructure fundings.
- Future RUC rates should reflect the portion of road maintenance that is not covered by weight fees.

Task 3: VMT in California

a) Average light-duty annual VMT based on: (1) vehicle class type, (2) region, and (3) income group
   1) Leveraging the outputs from EMFAC, we computed the VMT by vehicle class type from 2020 to 2030.

Table 8. Light-duty VMT in California from 2020 to 2030.

Vehicle class	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
LDA	1.62E+11	1.86E+11	1.86E+11	1.86E+11	1.85E+11	1.84E+11	1.83E+11	1.82E+11	1.81E+11	1.80E+11	1.80E+11
LDT 1	1.53E+10	1.73E+10	1.70E+10	1.67E+10	1.64E+10	1.60E+10	1.56E+10	1.52E+10	1.49E+10	1.47E+10	1.44E+10
LDT 2	7.02E+10	8.30E+10	8.59E+10	8.84E+10	9.05E+10	9.21E+10	9.34E+10	9.48E+10	9.61E+10	9.72E+10	9.83E+10
LHD 1	1.08E+10	1.24E+10	1.26E+10	1.27E+10	1.27E+10	1.26E+10	1.25E+10	1.23E+10	1.21E+10	1.19E+10	1.16E+10
LHD 2	2.62E+09	3.05E+09	3.12E+09	3.17E+09	3.19E+09	3.18E+09	3.17E+09	3.15E+09	3.11E+09	3.07E+09	3.01E+09
MDV	4.83E+10	5.62E+10	5.71E+10	5.78E+10	5.81E+10	5.81E+10	5.81E+10	5.81E+10	5.82E+10	5.83E+10	5.83E+10

Table 9. Medium- and heavy-duty VMT in California from 2020 to 2030.

Vehicle Class	Category	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Class 4	Medium-duty	5.96E+08	6.04E+08	6.12E+08	6.20E+08	6.26E+08	6.30E+08	6.33E+08	6.34E+08	6.31E+08	6.24E+08	6.12E+08
Class 5		1.14E+09	1.16E+09	1.17E+09	1.19E+09	1.20E+09	1.21E+09	1.22E+09	1.22E+09	1.22E+09	1.20E+09	1.18E+09
Class 6		1.27E+09	1.28E+09	1.30E+09	1.32E+09	1.33E+09	1.34E+09	1.35E+09	1.35E+09	1.35E+09	1.34E+09	1.31E+09
Class 7	Heavy-duty	1.23E+09	1.24E+09	1.26E+09	1.27E+09	1.28E+09	1.29E+09	1.30E+09	1.31E+09	1.31E+09	1.31E+09	1.31E+09
Class 8		1.43E+10	1.46E+10	1.48E+10	1.51E+10	1.54E+10	1.56E+10	1.59E+10	1.61E+10	1.63E+10	1.65E+10	1.66E+10

2) To compute light-duty **VMT by region**, we leveraged the 2019 California Vehicle Survey (CVS). In the CVS data, California is split into 6 regions: Los Angeles, San Francisco, San Diego, Sacramento, the Central Valley, and the rest of California. The last category is categorized as unknown, or "I don't know." As part of the CVS, respondents report the annual miles driven for each vehicle in the household. The 2019 survey also had dual odometer readings for a subset of the respondents. These odometer readings were used to improve the annual VMT measure when available.

In **Figure 5**, we have the average annual VMT for all the regions considered in the CVS data. Here the VMT estimates are weighted using household weights based on vehicle type, fuel type, prestige level, and vehicle model year. Among the 5 main regions, Los Angeles has the highest average annual VMT followed by the Central Valley, San Francisco, San Diego, and last is the Sacramento region.

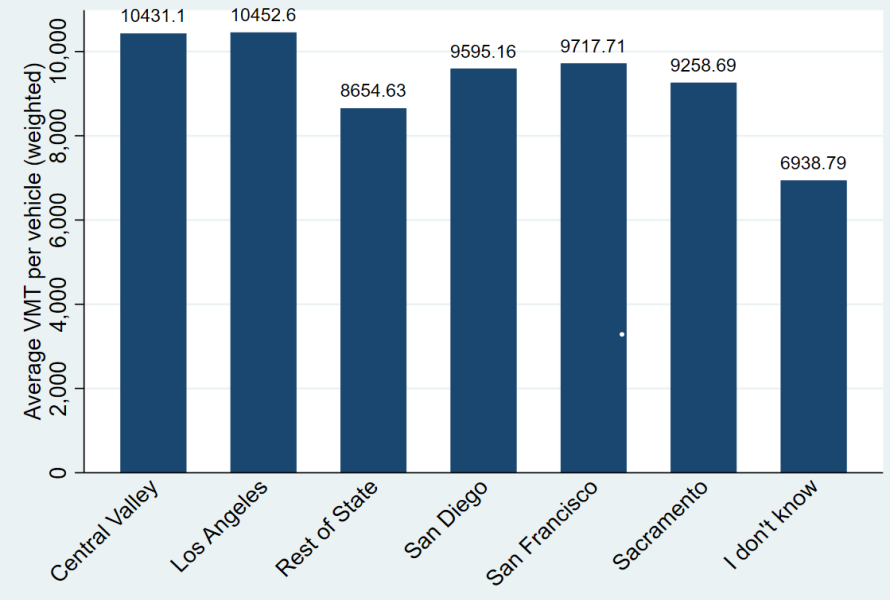

Figure 5. Average Annual light-duty VMT by region

3) **VMT by Income Group:** The income groups we consider here are "less than the 25th percentile, "25th-50th percentile", "50th-75th percentile", "75th-90th percentile", and "more than the 90th percentile". The 25th percentile income corresponds to an annual household income of $63,000, the 50th percentile income was $120,000, the 75th percentile income was $175,000, and the 90th percentile income was $280,000. The VMT measure here is total household VMT since the income groups are defined by the annual household income group. In other words, for income groups, we have not estimated VMT per vehicle. Figure 2 shows the average household VMT by the income groups defined above.

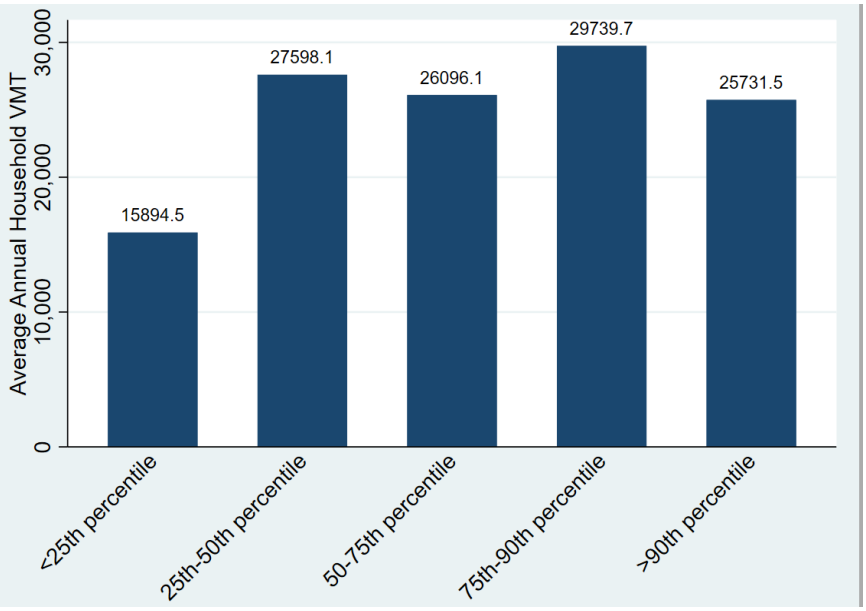

Figure 6. Average annual household VMT by income groups

b) Annual VMT analysis leveraging the California Statewide Travel Demand Model (CSTDM)

To compute historical VMT for light-, medium-, and heavy-duty vehicles, we leveraged the CSTDM outputs. The CSTDM divides light-duty and medium- and heavy-duty vehicle class types into the following categories:

- Short-Distance Personal (less than 100 miles/trip)
- Long-Distance Personal (greater than or equal to 100 miles/trip)
- Short-Distance Commercial (less than 50 miles/trip)
- Long-Distance Commercial (greater than or equal to 50 miles/trip)
- External Travel[22] (trips entering, existing, or through California)

For the private vehicle segment, we used the short-distance and long-distance personal vehicle trip files to compute VMT traveled for a representative day of the year and then multiplied by 365 to get the annual VMT. Similarly, for commercial vehicles, using appropriate files from CSTDM, we have estimated the medium- and heavy-duty vehicle long-distance, short-distance and out-of-state annual VMT. Table 9 below shows California's annual VMT distribution among personal and commercial vehicles for 2010.

There is some discrepancy between VMT in the CVS and the CSTDM. According to the CVS, the estimated average VMT driven by passenger vehicles in 2019 across multiple regions in California is about 9,300 miles. Meanwhile, the CSTDM estimated an average VMT of 16,000 miles for passenger vehicles in 2010. The lower estimates from the CVS could be a result of the sampling method of the survey and the weighting of the results.

[22] https://scag.ca.gov/sites/main/files/file-attachments/mtf012214_castatewidetraveldemandmodel.pdf?1602999652

Table 10. The breakdown of statewide VMT by trip length and by vehicle counts in California in 2010

Vehicle class	Short-distance VMT (billions)	Long-distance VMT (billions)	External VMT (billions)	Total VMT (billions)	Vehicles (millions)	total VMT/vehicle
Personal	410	0.03	49	459	29	1.58E+04
Commercial	10.6	37	50	97.6	1	9.76E+04

c) Estimate VMT changes in the next decade for light-, medium-, and heavy-duty vehicles

1) Light-duty VMT forecast

We leveraged the regression equation from EMFAC 2017 for estimating VMT driven on gasoline based on the following explanatory variables: gasoline price, national housing starts, unemployment rate, and population. See Equation 3 below for details of the regression equation. We obtained forecasts of gasoline prices from the Energy Information Agency's Annual Energy Outlook 2023[23]. The data on national housing starts which measures the number of new houses being built in a certain year was obtained from the Oregon Office of Economic Analysis[24]. We collected unemployment rates data from the Caltrans' California Economic Forecast for the period: 2021 to 2027, and applied a linear forecast to estimate the unemployment rate for 2028, 2029, and 2030[25]. Lastly, statewide population forecast data was collected from the California Department of Finance for the period 2021 to 2030[26]. The results of the light-duty VMT forecast are demonstrated in Table 10 below.

$$VMT_{gasoline} = -12.52 - 10.24 \cdot gasoline\ price\ \left(\frac{\$}{gallon}\ in\ 2015\ \$\right)$$
$$+0.0176 \cdot national\ housing\ starts\ (thousands)$$
$$-1.079 \cdot unemployment\ rate\ (\%) + 8.638 \cdot population \quad (3)$$

Table 11. Forecast of light-duty VMT in California from 2021 to 2030.

Year	VMT gasoline (billions)	Gasoline price ($ 2015)	National Housing starts (thousands)	Unemployment rate (%)	Population (millions)
2021	312.71	3.3	1600	7.5	39.24
2022	306.27	4.1	1600	4.2	39.03
2023	308.20	3.5	1400	4.6	39
2024	310.03	3.3	1400	4.8	39
2025	318.44	2.5	1400	4.6	39
2026	319.63	2.5	1400	4.3	39.1
2027	319.84	2.5	1400	4.1	39.1
2028	320.49	2.5	1400	4.3	39.2
2029	321.46	2.5	1400	4.2	39.3
2030	322.33	2.5	1400	4.2	39.4

[23] https://www.eia.gov/outlooks/aeo/data/browser/#/?id=3-AEO2023&cases=ref2023&sourcekey=0
[24] https://www.oregon.gov/das/OEA/Documents/appendixa.pdf
[25] https://dot.ca.gov/-/media/dot-media/programs/transportation-planning/documents/data-analytics-services/transportation-economics/socioeconomic-forecasts/2022/california-2022-a11y.pdf
[26] https://dof.ca.gov/forecasting/demographics/projections/

2) Medium- and heavy-duty VMT forecast

   To estimate the medium-duty and heavy-duty VMT in California, we leveraged the outputs from EMFAC on medium- and heavy-duty from EMFAC. Refer to Table 8 for details on the VMT forecasts of medium- and heavy-duty VMT.

Task 4: Estimates of administrative costs of RUC

To estimate potential administrative costs associated with a statewide RUC program, we identified costs in two categories: state agency staff costs and commercial account manager (CAM) costs.

State Agency Staff Costs

1) Identify state staff costs to administer a RUC program. The table below provides an estimate of potential state positions needed to administer a statewide road charge program. This table was developed by California Transportation Commission (Commission) staff. Commission staff developed the table based several resources, including the following:

   - In 2020, Commission staff developed an internal list of road charge program administrative tasks in collaboration the Oregon Department of Transportation (DOT) that was based on Oregon DOT's program development and administrative oversight materials for the OReGO road charge program. The list includes Internet Technology system actions the Oregon DOT set up before "going live" with their road charge program and tasks associated with processes set up to function in perpetuity once the program started.

   - In 2021, a group of consultants put together a report for Caltrans titled, "Enhancing the California Road Charge Program." The report included ideas about organizational structure and design for a road charge program.

   - In 2019 and 2022, Commission staff met with the DMV and gathered information about potential administrative functions of DMV staff, including the assumption that a process similar to the DMV's business partner process could be used in a road charge program.

   - In 2023, Commission staff gathered information about existing administrative costs associated with the collection of gas and diesel excise tax and spoke to staff from the State Controller's Office (SCO) about potential staff roles in a road charge program. This was completed as part of the Commission's support of the Road Charge Technical Advisory Committee's Senate Bill 339 road charge rate development and pilot design recommendations.

UCD staff reviewed and edited the table to avoid overlaps between CAM responsibilities and the responsibilities of staff from Caltrans, the DMV, the SCO, the California Department of Tax and Fee Administration (CDTFA), and the California Highway Patrol (CHP). Table 11 below represents an estimate of state staff costs. State classifications and associated costs are based on a point-in-time estimate and would need to be updated, as these rates change each year. Therefore, further review from each impacted Department is needed to refine the cost estimates.

Table 12. Estimated annual state agency staff costs by department and tasks

Cost Name	Staff Tasks	# of staff	Classification of Staff	Ave Annual Cost
Caltrans	Review monthly reports/updates	0.25	4724 - SENIOR TRANSPORTATION PLANNER	$ 43,500
	Prepare budget information	0.50	5157 - STAFF SERVICES ANALYST Range B (GENERAL)	$ 33,234
	Coordinate with the DMV	0.50	5157 - STAFF SERVICES ANALYST Range B (GENERAL)	$ 33,234
	Coordinate with SCO/CDTFA	0.25	5157 - STAFF SERVICES ANALYST Range B (GENERAL)	$ 16,617
	Coordinate with CHP	0.25	5157 - STAFF SERVICES ANALYST Range B (GENERAL)	$ 16,617
	Coordinate internally with Caltrans	0.25	4721 - ASSOCIATE TRANSPORTATION PLANNER	$ 37,000
	Develop monthly reports	0.50	4721 - ASSOCIATE TRANSPORTATION PLANNER	$ 74,000
	Report out to public, legislature, CalSTA, & others	1.00	4800 - STAFF SERVICES MANAGER I	$ 151,000
	Produce public messages	0.25	4721 - ASSOCIATE TRANSPORTATION PLANNER	$ 37,000
	Audit information	2.00	4175 - AUDITOR I	$ 141,000
	Contract		General administrative services	$ 200,000
		5.75	**Total Annual Caltrans Costs**	$ 783,202
DMV	Develop certification process & certify CAMS	1.50	5393 - ASSOCIATE GOVERNMENTAL PROGRAM ANALYST A	$ 196,500
	Develop enrollment process & enroll CAMS	1.50	5393 - ASSOCIATE GOVERNMENTAL PROGRAM ANALYST A	$ 196,500
	Review C&E process/decisions	0.50	4800 - STAFF SERVICES MANAGER I	$ 75,500
	High-level review C&E process/decisions	0.20	4801 - STAFF SERVICES MANAGER II (SUPERVISORY)	$ 33,200
	Develop and execute contracts with CAMS and oversee monthly Customer Service Reports	2.00	5393 - ASSOCIATE GOVERNMENTAL PROGRAM ANALYST A	$ 262,000
	Develop and execute contracts with CAMS and oversee monthly Customer Service Reports	1.00	5157 - STAFF SERVICES ANALYST Range B (GENERAL)	$ 66,468
	Resolve other issues	0.50	5393 - ASSOCIATE GOVERNMENTAL PROGRAM ANALYST A	$ 65,500
	Work with CHP to resolve enforcement issues	1.00	5393 - ASSOCIATE GOVERNMENTAL PROGRAM ANALYST A	$ 129,648
	Provide oversight of CAM management activities	0.50	4800 - STAFF SERVICES MANAGER I	$ 75,500

	Provide high-level oversight of CAM management activities	0.30	4801 - STAFF SERVICES MANAGER II (SUPERVISORY)	$ 49,800
	Review invoices and payments and other road charge info	1.00	4175 - AUDITOR I	$ 70,500
	Prepare budget information	0.50	5157 - STAFF SERVICES ANALYST Range B (GENERAL)	$ 33,234
	Audit CAMS	1.00	4175 - AUDITOR I	$ 70,500
		11.50	**Total Annual DMV Costs**	**$ 4,324,850**
SCO	Process invoices	1.50	5157 - STAFF SERVICES ANALYST Range B (GENERAL)	$ 99,702
	Collect payments	1.00	5157 - STAFF SERVICES ANALYST Range B (GENERAL)	$ 66,468
	Distribute payments	0.50	5157 - STAFF SERVICES ANALYST Range B (GENERAL)	$ 33,234
	Audit payments	1.00	4175 - AUDITOR I	$ 70,500
		4.00	**Total Annual SCO Costs**	**$ 269,904**
CDTFA	Collect payments	1.0	5157 - STAFF SERVICES ANALYST Range B (GENERAL)	$ 66,468
	Advice on processes	1.0	5393 - ASSOCIATE GOVERNMENTAL PROGRAM ANALYST A	$ 131,000
		2.0	**Total Annual CDTFA Costs**	**$ 197,468**
CHP	Complete enforcement actions	2.00	8397 - OFFICER, CALIFORNIA HIGHWAY PATROL RANGE B	$ 259,296
	Coordinate with DMV, Caltrans, and CAMS	1.00	5393 - ASSOCIATE GOVERNMENTAL PROGRAM ANALYST A	$ 131,000
	Complete audits	1.00	4175 - AUDITOR I	$ 66,468
	Oversee work	1.00	8385 - ASSISTANT CHIEF, CALIFORNIA HIGHWAY PATROL	$ 256,920
		5.00	**Total Annual CHP Costs**	**$ 713,684**
TOTAL Cost		**28.25**	**Total Annual State Staff Costs**	**$ 6,289,108**

Commercial Account Manager Costs

1) Estimates of back-office operating costs from the tolling industry

As part of UCD work investigating ways to integrate tolling and road charge, UCD staff collected data on tolling systems' operating costs of their back-office. The back-office manages system transactions (e.g., capturing and processing tolls) and customer service. The annual operating costs of the back office range from $3 to $35 million, depending on transaction volume and active accounts. Out of the tolling agencies that we interviewed, the number of active accounts ranges from 440,000 to 11 million, while the daily transaction volume ranges from 350,000 to 2.5 million. To reduce the operating costs of their back office, many tolling agencies overgo a competitive bidding process to select the CAM to operate their

back office.

Based on 2023 DMV data[27], there are currently 35.7 million registered vehicles in California. A rough estimate of tolling agency costs for existing drivers may be developed by dividing an average of the annual back-office tolling agency operating costs into an average of the total active accounts managed by tolling agencies. This yields a quotient of $5 per active account. Assuming it costs $5 to manage each active account, and assuming registered vehicles are roughly equivalent to active accounts, then based on the number of 2023 registered vehicles, back office operating costs for tolling agencies may equal around $180 million a year. However, in actual practice, it is likely that accounts will be managed in several different ways, including traditional CAMs and through the annual registration process, and tolling agencies will likely only cover a portion of total customer accounts in California.

2) The potential needs for more enforcement and coordination among CCHP, the DMV, Caltrans, and CAM

From our RUC-tolling integration research, we identified that revenue leakage is a big concern for tolling agencies. The following diagram provides a breakdown of the transaction volume and the success of collection. As demonstrated below, un-pursuable and uncollectable transactions make up about 13% of total transactions for one of the interviewed tolling agencies. To collect this portion of the revenue would require additional enforcement from the CHP front. Furthermore, to collect transactions which do not have an established account entails coordination between the CAM and the DMV to identify the vehicle ownership information in order to process these transactions. Based on the lessons learned from the tolling industry, it is likely that enforcement costs for the un-pursuable and uncollectable portion of the transactions would be higher.

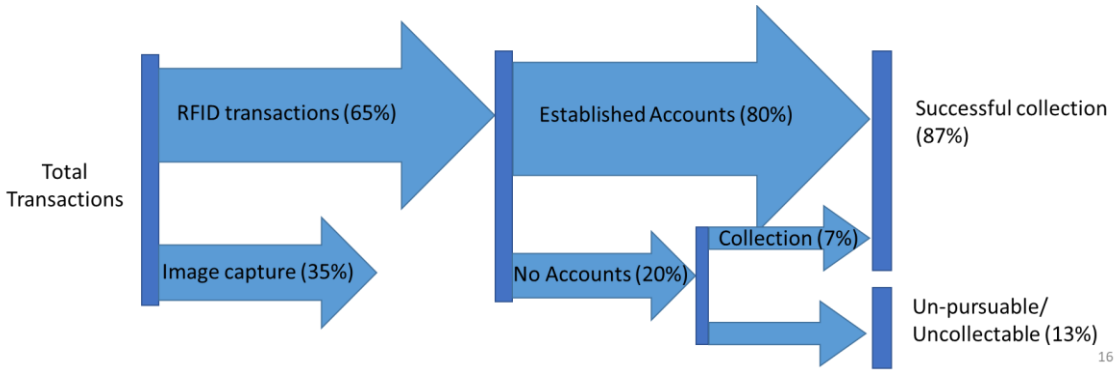

Figure 7. The breakdown of total transactions in a tolling system by transaction type (e.g., RFID vs. image capture) and account types (e.g., established account vs. no accounts).

3) Lessons learned from Hawaii's integration of RUC and annual vehicle inspection[28]

Hawaii has been a proponent of leveraging their annual vehicle inspections to collect odometer readings from vehicles. Currently, the State collects vehicle registration fees and weight taxes as part of their annual vehicle inspection, and the State is planning to incorporate odometer reading as part of this process. In the City and County of Honolulu, the administrative costs associated with this process are around $24/vehicle and approximately 5% - 10% of its collected revenue. Hawaii expects to reduce this

[27] https://www.dmv.ca.gov/portal/file/top-ten-california-dmv-facts-pdf/
[28] https://hiruc.org/wp-content/uploads/2022/08/E-1-Administrative-Issues-Report.pdf

percentage of administrative costs to 2% - 4% by more efficiently leveraging existing agencies to collaborate with each other. Specifically, they proposed a close collaboration between the county-level DMV and the vehicle inspection program to share information on odometer reading and to reduce bureaucratic hurdles in collection. As California seeks to implement a state-wide RUC, it is important to consider existing programs that can be leveraged to reduce the costs of collecting mileage data.

Key Takeaways

- It is possible from looking at existing state classifications and the tasks associated with program oversight to estimate state agency staff costs associated with administering a road charge program. However, the costs associated with account management may vary greatly depending on the design of the program.
- Tolling agencies, traditional CAMs, and annual fees are all potential methods of collecting a road charge. Regardless of how a road charge is collected, a certain level of account management will be needed.
- A road charge will likely be phased in over time, so the number of accounts being managed will not equal the number of registered vehicles in California in the first few years of the program. In future years it is also likely that there may be more than one account associated with one registered vehicle.
- Based on the rough point-in-time estimates arrived at through this research, administrative costs of a road charge program may cost around $6 million for state agency staff and $58 million for account management, which is a total of $64 million a year. The July 2023 Budget Act assumed a total of $6.3 billion from state gas and diesel tax revenues in fiscal year 2023-24, and $64 million is 1 percent of this amount.

Conclusion

In aiding the Commission on understanding the implementation challenges and opportunities of a RUC in California, we completed the following tasks: 1) compiling examples of the road charge rates used by other states, 2) devising RUC rates for medium- and heavy-duty commercial vehicles, 3) estimating vehicle-miles travelled (VMT) for light-, medium- and heavy-duty vehicles, and 4) estimating the administrative costs associated with implementing a RUC. The first task served to provide background understandings on RUC rate-setting methodologies by presenting the differences and similarities on rate-setting across different states. By investigating the different fees that medium- and heavy-duty vehicles currently pay for in California, we provide a well-rounded picture of the financial contribution of these vehicles to transportation infrastructure. These results also allowed us to devise more appropriate RUC rate recommendations for medium- and heavy-duty vehicles based on current and projected diesel excise taxes revenues. Another critical component to our estimates of transportation fundings from motor fuel taxes is the forecasts for VMT. By leveraging outputs and tools in EMFAC, we estimated VMT for light-, medium-, and heavy-duty vehicles from present to 2030. Lastly, our analysis of administrative costs associated with RUC implementation showed positive results of reducing the administrative costs to a range that is similar to that of motor fuel taxes. Overall, this series of analysis helped address certain knowledge gaps which are currently existing in policymaking of RUC. By providing quantitative analysis on these topics, we hope this report advances the Technical Advisory Committee's understandings on these issues and aids the implementation of the RUC pilot.