M e m o r a n d u m

To: CHAIR AND COMMITTEE MEMBERS,
CALIFORNIA ROAD CHARGE TECHNICAL
ADVISORY COMMITTEE

TAC Meeting: December 11, 2015

Tab No.: 7
Action

From: WILL KEMPTON
Executive Director

Subject: **FINAL TAC RECOMMENDATIONS REPORT**

ISSUE:

The Road Charge Pilot Design Recommendations report contains the key policy and design recommendations the California Road Charge Pilot Program Technical Advisory Committee (TAC) has concluded are critical to the implementation of the pilot program, along with the recommended criteria to be used to evaluate the pilot program. The draft report was approved by the TAC at its November 20th meeting. The report will be presented as an informational item at the California Transportation Commission meeting on December 9th to provide an opportunity for Commissioners to give input. Staff will provide a verbal update at the TAC meeting regarding comments or suggestions from the Commissioners.

RECOMMENDATION:

Staff recommends the TAC consider any comments or suggestions received at the Commission meeting. The TAC may approve modifications to the report based on that input or choose to take no action.

BACKGROUND:

On September 29, 2014 the Governor signed Senate Bill 1077 (DeSaulnier, Road Usage Charge Pilot Program) mandating the Commission Chair, in consultation with the California State Transportation Agency (CalSTA) Secretary, to create a 15-member Road Usage Charge Technical Advisory Committee (TAC) to study road usage charge alternatives to the gas tax, gather public input, and to make recommendations on the design of a pilot program. CalSTA intends to implement the road usage charge pilot program by July 2016 based on the recommendations of the TAC and submit to the Legislature, the TAC, and the Commission, a report of its findings by August 2017. The Commission is required to include its recommendations regarding the pilot program in its annual report to the Legislature.

December 3, 2015

Road Charge Pilot Design Recommendations

California Road Charge Technical Advisory Committee

Letter to CalSTA

Dear Secretary Kelly,

On behalf of the California Road Charge Technical Advisory Committee (TAC) it is my pleasure to present the Road Charge Pilot Design Recommendations (Report) adopted by the TAC pursuant to Senate Bill 1077 (Chapter 835, Statutes of 2014). Over the past year the TAC has met monthly throughout the state gathering public input related to the design and implementation of a road charge pilot program and has studied, discussed, and deliberated a variety of policy and technical issues. This Report contains the key policy and design recommendations the TAC concludes are critical to the implementation of the pilot program, along with the recommended criteria for evaluation of the pilot program.

While this endeavor has been rigorous, it resulted in the unique opportunity to examine and develop a potential long-term solution to the transportation funding crisis facing California and the rest of the nation through a per-mile road charge mechanism. It is clear the current gas tax system will not keep pace with state and national needs. It has also become apparent the development and implementation of a sustainable solution will take time to deliver.

As the caretakers of California's transportation infrastructure we need to be cognizant of the immediate network needs. In addition, we must look to the future to ensure funding systems are adaptable to evolving technologies. In the very near future, all new vehicles will have on-board telematics which could work with a future road-charge system. This will dramatically change how we drive and exchange information. With the advent of autonomous vehicles and on-board technologies, the motoring public will have more choices for how they move within their communities and throughout the state.

Submittal of this report is just the beginning. Implementation of a road charge requires adaptability and flexibility. The TAC is committed to providing continuing guidance to the State Transportation Agency, policy makers, and the public to ensure the program is an innovative solution for stabilizing transportation funding for the long term.

On behalf of all members of the TAC, it has been an honor to serve and be part of a project that could transform infrastructure funding in California and potentially the nation. We stand ready to provide any additional assistance on this very important endeavor.

Sincerely,
Jim Madaffer, Chair, California Road Charge Technical Advisory Committee

ACKNOWLEDGEMENTS

by Jim Madaffer, Chair, California Road Charge Technical Advisory Committee

The dedication and perseverance of all the members of the Technical Advisory Committee (TAC) over the past year is to be commended. Each member of the TAC brought their own stakeholder perspective to the table resulting in a truly transparent and collaborative process in the development of this report. It has been an honor to serve as their Chair and as a member of such an auspicious group of talented individuals.

In addition to this exceptional group of 15-members, the TAC had the foresight to constitute a 22-member Workgroup of industry leaders and stakeholders to serve as a resource to the TAC. Over the months of development the Workgroup provided valuable insight into the deliberation and decision making process of the TAC. Their counsel and observations in the development of recommendations are greatly appreciated.

We owe a debt of gratitude to the California Transportation Commission (CTC) and the California State Transportation Agency (CalSTA) for their efforts in the identification, recruitment and appointment of the TAC members in a very condensed time frame. Their thoughtful consideration of the members of the TAC resulted in a diverse and engage group of volunteers.

I would be remiss not to provide a special thanks to the CTC staff, Caltrans management, staff and consulting team for their support and guidance of the TAC over the past year. Without their commitment to this endeavor this report we would have been lost.

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Executive Summary

An efficient transportation system is critical for California's economy and quality of life. The revenues currently available for highways and local roads are inadequate to preserve and maintain existing infrastructure and to provide funds for improvements that would reduce congestion and improve safety. Because of improving fuel economy, motor fuel taxes are ineffective methods of meeting California's long-term revenue needs; they will steadily generate less revenue as cars and trucks become more fuel efficient and alternative sources of power are identified. By 2030, as much as half of the revenue that could have been collected will be lost to fuel efficiency.

In an effort to address this problem, in 2014 the Legislature passed and the Governor signed into law Senate Bill (SB) 1077, establishing a Technical Advisory Committee (TAC) under the California Transportation Commission (CTC). The TAC was assigned the task to formulate recommendations for the design of a pilot project to explore the risks and benefits of road charging as an alternative to the gas tax. The CTC in consultation with the California State Transportation Agency (CalSTA) identified and appointed a 15-member TAC representing a broad-spectrum of individuals and a diverse group of stakeholders from across the state.

The TAC publically convened monthly throughout the state to discuss various policy and technical issues related to the design and implementation of a road charge pilot program. The law provided policy, design criteria and privacy protections guidance to assist in the TAC's deliberations and recommendations in the development of the pilot to test road charging in California.

This report consists of the key policy and design recommendations the TAC has concluded are critical to be implemented and studied during the pilot phase of the program. In addition to specific recommendations the TAC has also identified areas that will need further consideration at the completion of the pilot program.

The TAC recommendations are broken down into five categories: 1) Technical and Organizational Design, 2) Privacy, 3) Data Security, 4) Enforcement, and 5) Other Policy Issues and Recommendations. Each of these categories were thoroughly researched and publically examined by the TAC prior to formulation and adoption of the final recommendations. The TAC took proactive measures to ensure public engagement and input throughout the process.

The table below summarizes the recommendations of the TAC based on category with a thorough discussion of each recommendation in the body of the report.

Topic	Recommendation
Technical & Organizational Design	The pilot should offer drivers a choice in mileage recording methods.
	The pilot should offer drivers a choice in account managers.
	Out-of-state vehicles should be included in the pilot and simulate payment for driving on California roads.
	The pilot should test an open system design.
	The pilot should test the interoperability of California's system with that of other states.
	The pilot should include individuals, households, businesses, and at least one government agency.
	The pilot should include a cross-section of at least 5,000 vehicles that are reflective of the fleet currently using California's road network.
	The pilot should offer methods to exempt miles driven on private road or out of state.
Topic	**Recommendation**
Privacy	The pilot should feature specific governance, accountability, and legal protection approaches for protecting privacy.
Data Security	The pilot should test ten data security features: Authentication, Authorization, Encryption, Data Modification Notification, Data Masking, Data Storage, Data Transmittal, Data Destruction, General IT Network Security, and Third Party Data Security System Verification.
Enforcement	The pilot should check for anomalies in mileage reporting; such as ensuring mileage permits and odometer readings are current, and reviewing electronic logs of the automated distance measurement operational concepts.
Other Policy Issues & Recommendations	**Income equity implications of a road charge** - Once the road charge pilot project yields data about the types of vehicles owned, mileage driven and opinions held by the participants, more in-depth analysis should be conducted on impacts on lower-income persons. The TAC recommends this issue be taken up in any future phase of road charge policy development work.
	Potential differential impacts on urban vs. rural residents - The TAC recommends that this issue be carefully monitored during the pilot, and that impacts of the road charge on rural drivers when compared with their urban counterparts should be assessed. The recommended composition of the volunteer pool reflects this concern and oversamples rural participants to ensure sufficient data is available to fully assess the impacts of the road charge on rural drivers.
	Payment Simulation Options for the Pilot - TAC recommends the simulation of payments be tested during the pilot utilizing online and mail payment options, studying the administrative costs of each.
	Rate Setting for the Pilot - The TAC recommends that in order to adequately assess the ability to invoice based on per-mile rates, a revenue neutral rate should be developed for the pilot program.

With the completion and submittal of this report the next phase of implementation and deployment of the pilot program resides with CalSTA. Moving forward the TAC will continue to meet periodically to receive updates on the progress of the pilot, to provide advice to CalSTA and to clarify any recommendations presented in this report.

Pursuant to SB 1077 the TAC will receive the final report on the findings of the pilot, providing comments and recommendations to CTC for inclusion in the Annual Report to the Legislature.

1. Introduction

This report presents the California Road Charge Technical Advisory Committee's (TAC) recommendations to the California State Transportation Agency (CalSTA) on the design of a pilot program to test the feasibility of a road charging system in California. These recommendations are made in accordance with Senate Bill (SB) 1077 (DeSaulnier, Statutes of 2014). This section provides a brief overview of SB 1077, the factors and trends that led to the legislation, and detailed information about the TAC's process and activities that resulted in the final recommendations to CalSTA.

1.1. Preview of Report Sections

Section 2 provides a compilation of all TAC pilot design recommendations. Sections 3 and 4 describe in detail the technical and operational issues as well as privacy and data security policies considered by the TAC in arriving at the pilot design recommendations. Section 5 provides an overview of the evaluation criteria developed for the pilot program. Enforcement and compliance activities to be performed during the pilot are presented in Section 6. Other policy issues and TAC recommendations are presented in Section 7, and Section 8 describes the TAC's public input and involvement process, results and emerging themes.

1.2. SB 1077: Authorizing the California Road Charge Pilot

Faced with erosion of motor fuel tax revenues over time and the need for the state "to begin to explore alternative revenue sources that may be implemented in lieu of the antiquated gas tax structure now in place"[1] the California state Legislature passed and Governor Brown signed, SB 1077, directing the Chair of the California Transportation Commission (CTC), in collaboration with the Secretary of CalSTA, to create a Technical Advisory Committee (TAC) to study road charging alternatives to the California gas tax and to make recommendations to CalSTA on the design and evaluation of a road charging pilot program. The Legislature also directed that a statewide pilot program be conducted to test various road charging policies, technologies and payment approaches. Once the TAC's recommendations have been submitted to CalSTA, pre-implementation activities will begin in preparation for the statewide pilot project that is scheduled to run from summer 2016 – spring 2017.

SB 1077 provides the policy basis, design criteria and important privacy protections that guided the TAC's consideration, deliberations and recommendations regarding a pilot test of road charging in California. The law makes clear that the reasons for a road charge are the current inadequacy of revenue to fund highways and local roadways[2] and the diminishing effectiveness of the gas tax to meet long-term funding needs due to the factors described in Section 1.4 in this report[3]. SB 1077 specifically states the road charge is intended to be a *replacement mechanism for the gas tax* – drivers would not pay a road charge in addition to a state gas tax:

[1] Senate Bill Number 1077 (2014), Section 1. See Appendix 1 for full text of legislation.
[2] Ibid, Section 1(b)
[3] Ibid, Section 1(c)

(h) It is therefore important that the state begin to explore alternative revenue sources that may be implemented in lieu of the antiquated gas tax structure now in place[4].

The TAC observed other possible policy reasons for considering a road charge system in California, including the potential for a road charge to be a more equitable way to pay for roadways, since those who drive more (and thus benefit more from the roadways) would pay in direct proportion to their actual road usage, rather than paying based on the fuel consumption of their vehicle.

1.3. Development of TAC Recommendations

Utilizing the membership guidance provided in SB 1077, the Chair of the CTC, in collaboration with the CalSTA Secretary, identified and appointed the 15-member Committee representing the following areas:

- Telecommunications Industry
- Highway User Groups
- Data Security and Privacy Industry
- Privacy Rights Advocacy Organizations
- Regional Transportation Agencies
- National Research and Policymaking Bodies
- Members of the Legislature
- Other relevant stakeholders as determined by the Chair

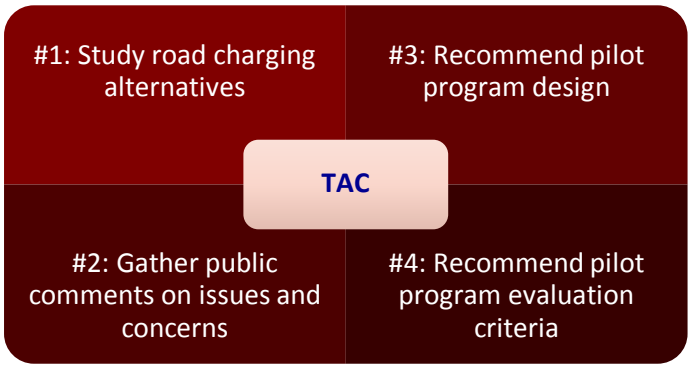


Figure 1

Commission staff consulted with individuals representing the Legislature, Caltrans, Regional Transportation agencies, and other interested stakeholders to identify organizations and individuals that represent a broad-based membership for consideration (See Appendix 2 for a complete roster and biographies).

Pursuant to SB 1077, the TAC serves as an independent body to study technical aspects of road charging alternatives and gather public input on issues and concerns. The TAC assumed responsibility for assimilating information and seeking public input to establish the basis for pilot design and evaluation criteria recommendations. The main TAC activities are grouped in the four areas identified in Figure 1.

1.3.1. Activity 1: TAC Study of Road Charge Alternatives

There are many options for measuring and reporting the vehicles use of the roadway network. Examples include self-reported mileage, certified odometer readings, smartphone-based mileage reporting, in-vehicle device-based mileage reporting, and telematics-based[5] reporting.

[4] Ibid, Section 1(h)
[5] Telematics is the blending of computers and wireless telecommunications technologies

Throughout the year, the TAC studied these and other methods through operational concept development, business case analysis, policy issue evaluation, and organizational design. These activities are detailed throughout this report.

1.3.2. Activity 2: Gathering Public Comment on Issues and Concerns Related to the Pilot Program

In addition to evaluating the technical dimensions of road charging, the TAC developed an extensive public involvement effort to provide key information and feedback on the Committee's policy and design recommendations. These activities are fully described in Section 8 *Public Input and Involvement* and included twelve open public meetings held at various locations throughout California; establishment of a road charge work group[6], representing over 22 stakeholder groups, to provide unique perspectives and feedback on the TAC's work and recommendations; development and launch of a dedicated California Road Charge website to provide public information and to receive public comments; convened focus groups in five different California locations to gain better insight into public knowledge and opinion regarding a potential road charge; conducted a statewide public telephone survey to assess initial public attitudes about road charging as a method of funding transportation; and participated in numerous stakeholder conferences and workshops.

The monthly TAC meetings were structured to receive and review information on the worldwide experience with road charging, examine alternative operational approaches to its implementation, identify key policy issues to consider in implementing a road charge, and to hear from members of the public.

1.3.3. Activity 3: Recommend Road Charging Approaches and Pilot Program Design to CalSTA

SB 1077 contains specific areas for the TAC's consideration, which were framed as decision points for the TAC's recommendations to CalSTA. A list of the summarized decision points is below. The TAC's basic recommendations for each of these pilot design questions can be found in Section 2 *Recommendations* with more elaboration on each recommendation found in other sections of this report.

[6] Cite to Section 7 description of Work Group members and organizations, with full roster in Appendix 3

Table 1: TAC Decision Points Addressed

CATEGORY	TAC DECISION POINTS ADDRESSED
Technical Design	Should both manual and automated recording and reporting be offered in the pilot?
	Should a GPS-based option for recording mileage be offered in the pilot?
	Should the road charging pilot use open or closed systems?
	Should the pilot assess road charges on out-of-state vehicle owners driving on
Organizational Design	Should the pilot test interoperability with other states considering road charges? with toll systems?
	Should drivers in the pilot be offered a choice among multiple road charge
Policy	What types of participants should be included in the pilot?
	Are there any exemptions from road charging to be included in the pilot?
	What specific personal privacy protections should be used for the pilot?
Business Case Analysis	What vehicles are included in the pilot?
	Should the pilot simulate a per-mile rate that differs by vehicle type?
Technical Design	What system data security requirements should be used for the pilot?
	How many participants should be involved in the pilot?
	How should pilot participants be distributed throughout the state?
Evaluation Strategy	What evaluation criteria does the TAC recommend for the pilot?
Technical Design	What type of enforcement and compliance activities should be demonstrated?

1.3.4. Activity 4: Recommend Pilot Design Evaluation Criteria

In parallel with determining the pilot dimensions to test, the TAC developed and recommended criteria for evaluating the pilot program. The TAC recommends that the evaluation be carried out by an independent evaluator during and upon conclusion of the pilot project. It is also recommended that the evaluation results be communicated to the TAC during the implementation process and upon conclusion of the pilot. The TAC anticipates that the independent evaluation will result in the issuance of four separate technical reports, the results of which will be addressed and incorporated into the comprehensive California Road Charge Pilot Project Final Report issued by CalSTA and submitted to the TAC, CTC and the Legislature.

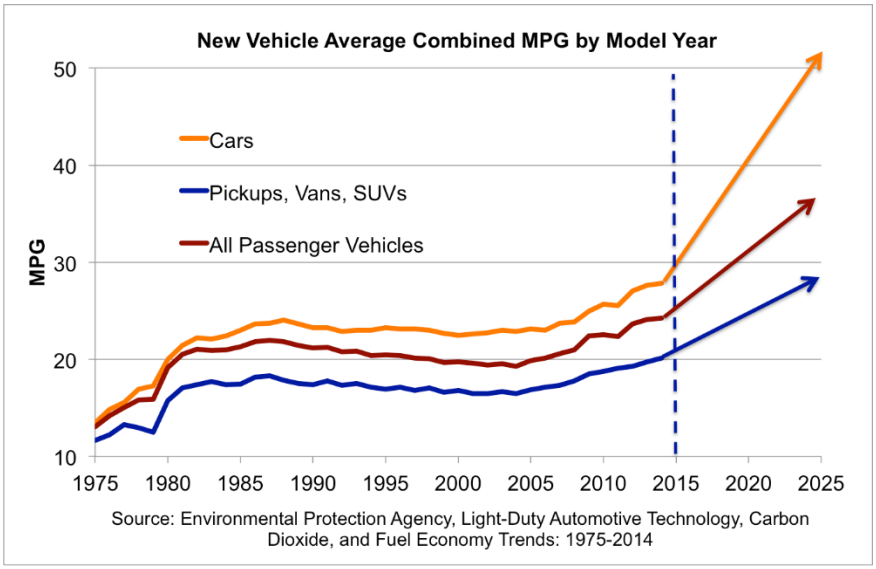
1.4. Factors Leading to Exploration of Road Charging in California

Historically, construction, maintenance, and operation of California's public roads have been funded through a variety of mechanisms including fuel taxes on both gasoline and diesel, registration and licensing fees, tolls, weight fees on commercial vehicles, and Federal funds derived primarily from fuel taxes. Of all these sources, fuel taxes represent the most prevalent highway revenue source for California. However, improvements in vehicle fuel economy and

conversion of the fleet to other energy sources (e.g., electric vehicles), is undermining fuel tax revenues. This erosion of fuel tax revenue exacerbates the inability of state and local governments to adequately maintain our transportation system.

According to the University of Michigan Transportation Research Institute, EPA-measured average fuel economy of new light vehicles across the United States has improved each year since 2008, from 20.8 miles per gallon (mpg) for Model Year 2008 to 25.3 mpg in 2014. In the past [three] years, average fuel economy of new light vehicles in the United States has improved about 1 mpg per year.[7] Based on the new Corporate Average Fuel Economy (CAFE) standards, the availability of new vehicle technology, consumer purchasing habits, government incentives, and other factors, the possibility exists for continued improvement in on-road fuel economy of the light vehicle fleet. For example, the U.S. Energy Information Administration projects an improvement in on-road fuel economy of the light vehicle fleet nationally of 2% per year, or 73% through 2040, to 37.2 mpg.[8] This trend is illustrated in Figure 2.

Figure 2: New Vehicle Average Combined MPG by Model Year[9]



Since taxes on fuel consumption are the primary source of highway maintenance funding in California, increasing fuel economy translates directly into decreased per-mile funding derived from fuel taxes, in the absence of a tax increase. Figure 3 illustrates the relationship between fuel economy and fuel tax revenues on a per mile basis. The horizontal axis depicts on-road fuel economy as reflected in mpg, while the vertical axis represents the equivalent cents per mile in fuel tax paid, at 30 cents per gallon (the combined rate of the base excise tax and price-based excise tax on gasoline in California as of July 1, 2015). California light vehicles averaged about

[7] University of Michigan Transportation Research Institute. *Eco-Driving Index*. Accessed 6 November 2014. Available from: http://www.umich.edu/~umtriswt/EDI_sales-weighted-mpg.html
[8] U.S. Energy Information Administration. *Annual Energy Outlook 2014*, April 2014.
[9] The forecasted trend lines are based on U.S. Energy Information Agency projects of national trends, which in turn are based on federal CAFE standards.

20 miles per gallon in 2014.[10] This means that the average gasoline-powered car is contributing 30 ÷ 20 = **1.5** cents per mile driven in fuel taxes. The fuel economy for *new* vehicles in the 2015 Model Year is projected to average just over 26 miles per gallon, so those cars are contributing only (30 ÷ 26) = **1.1** cents per mile on average. Using California Air Resources Board's (CARB) projected light vehicle fleet fuel economy in California of 39 mpg, drivers will be paying only (30 ÷ 39) = **0.77** cents per mile by 2040, a decrease of 37% from today. The purchasing power of this declining per-mile revenue will be further eroded by inflation. If fleet fuel economy continues to improve as newer cars replace older vehicles in the fleet, the equivalent amount paid by the average vehicle as measured in cents per mile will decline significantly.

Figure 3: Fuel tax expressed in cents per mile as a function of fleet fuel economy

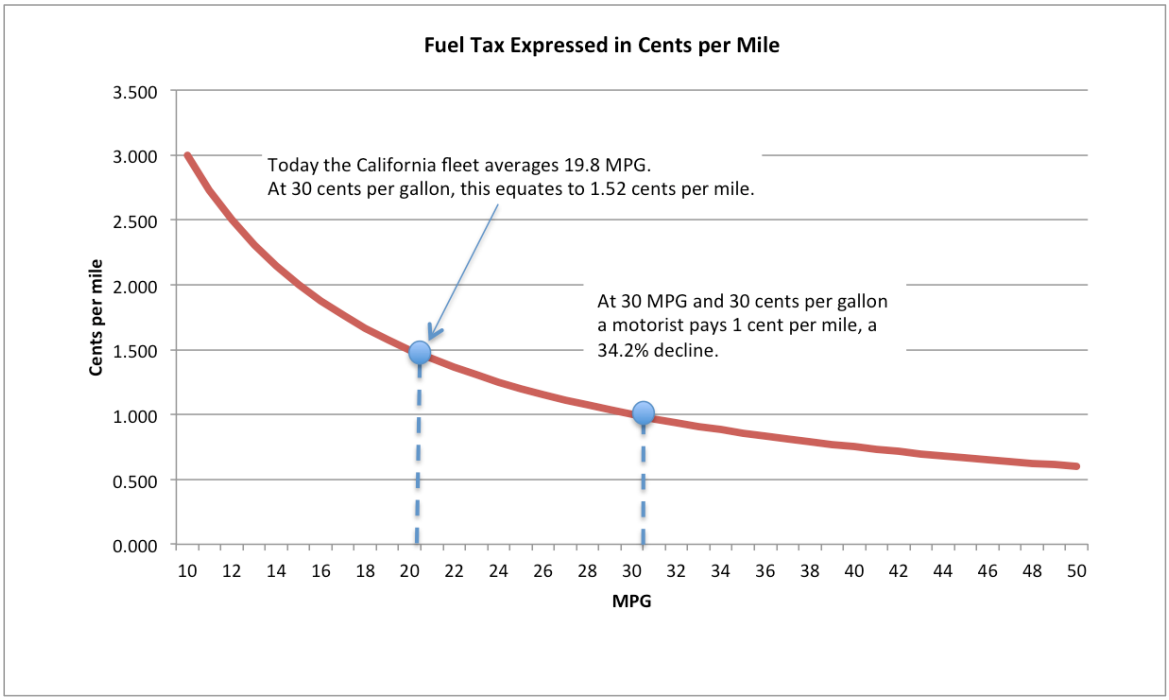
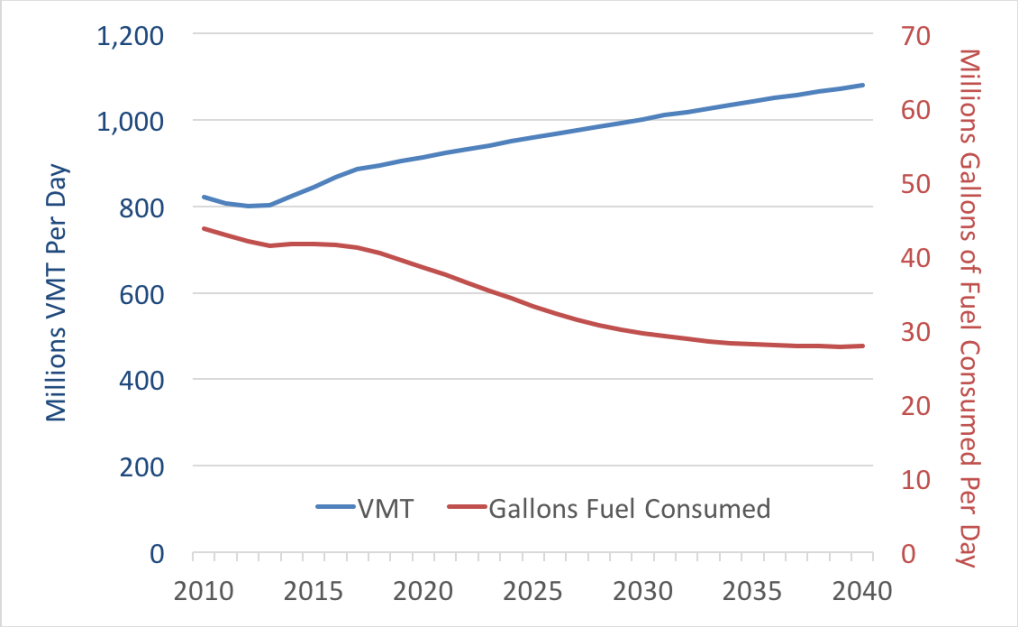


Figure 4 shows projected VMT per day by light vehicles (under 10,000 pounds) and corresponding fuel consumption per day by light vehicles (gasoline and diesel). This chart is based on outputs provided by the California Air Resources Board's 2014 EMission FACtors (EMFAC) model.

[10] Based on analysis of data provided to the consultants by the California Air Resources Board from the EMFAC 2014 model.

Figure 4: Recent and projected VMT and fuel consumption of light vehicles (2010-2040)



The consequence of these two divergent projected trends is a reduction in fuel tax revenue per mile driven, assuming the fuel tax rate per gallon remains fixed. Figure 5 depicts recent and projected fuel excise tax revenue in nominal dollars from light-duty vehicles (under 10,000 pounds) based on a $0.30 per gallon tax from 2010-2040. Figure 6 depicts the same trend discounted to 2015 dollars.

Figure 5: Projected fuel tax revenue expressed in cents per mile driven – nominal dollars

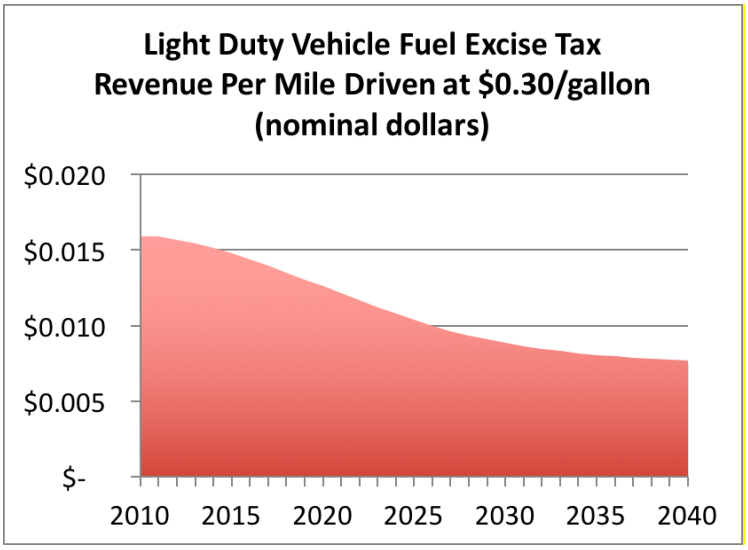
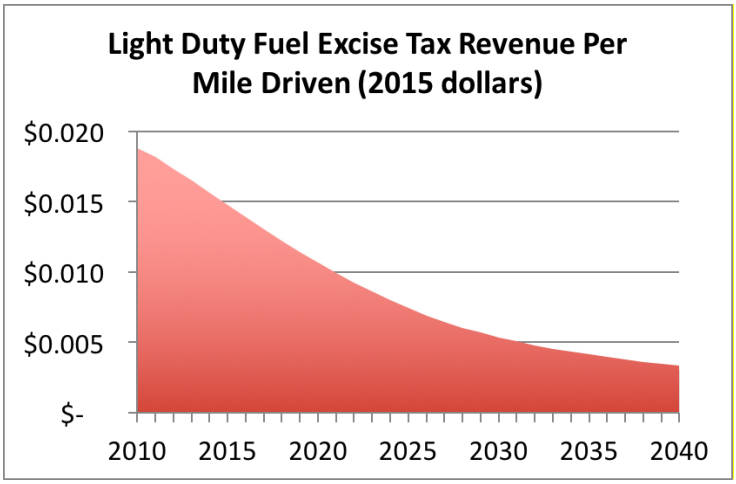


Figure 6: Projected fuel tax revenue expressed in cents per mile driven – adjusted for inflation



1.5. Revenue Erosion Due to Inflation

While increasing fuel economy in the vehicle fleet is likely to cause erosion in the per-mile revenue from the gas tax. It is important to point out that the purchasing power of the gas tax has been diminished by inflation as well. Currently there are two state excise taxes imposed on gasoline in California: the state base excise tax of $0.18 cents per gallon and a price-based excise tax currently set at $0.12 cents per gallon, 1994 was the last year that the base excise tax was raised. Based on the California Highway Construction Cost Index, that $0.18 is now worth about $0.078. The state price-based excise tax is set annually at a level that generates the same amount of revenue as would have been generated by the base state sales tax. Revenues generated from the price-based excise tax are adjusted annually, not based on inflation, but based on the value of gasoline.

2. Recommendations

Over the past year the TAC has held monthly public meetings throughout the state considering a large amount of technical information and deliberating both the policy and technical merits of various road charging alternatives to the gas tax. This section summarizes the TAC's recommendations on the design and evaluation of the Road Charge Pilot Program.

The TAC recommends the following design parameters for the Road Charge pilot program:

2.1. Technical & Organizational Design: Mileage Recording Methods

The TAC has determined the pilot should offer drivers a variety of mileage recording methods. Methods recommended for the pilot include: time permits, mileage permits, postpay odometer charges, automated distance charging without location information, and automated distance charging with general location information. Out-of-state drivers participating in the pilot should be limited to choosing either the time permit or automated distance charging with general location. Choice in mileage recording and reporting methods should be offered to address a range of issues including consumer privacy concerns, income equity concerns and the technical requirements presented by California's very diverse vehicle fleet and geography.

2.2. Technical & Organizational Design: Account Managers

The TAC has determined the pilot should offer drivers a choice in account managers. The TAC recommends that more than one non-state (commercial) account manager should be available for pilot participants to choose from, and a simulated state account manager should also be offered. Additionally, the commercial account managers may offer value-added services to pilot participants.

2.3. Technical & Organizational Design: Out-of-State Vehicles

The public has voiced concerns over how visitors will pay for use of California roadways under a road charge system. To address this issue the TAC is recommending the inclusion of out-of-state drivers in the pilot and to simulate payment for driving on California roads. Drivers from neighboring states who drive regularly in California should be recruited to participate in the pilot. Their inclusion will facilitate testing the feasibility and cost of collecting a road charge from out-of-state drivers. Including these drivers in the pilot will also provide an opportunity to assess any legal issues related to collecting road charges from drivers who travel across state borders. For the trucking industry, this aspect of the pilot will test whether a road charge can be assessed in an effective, efficient manner, without duplicative reporting requirements for heavy trucks (which are already required to report mileage driven in each jurisdiction traveled by the International Fuel Tax Agreement, or IFTA).

2.4. Technical & Organizational Design: Open System Design

The road charge pilot system should be designed in a way that is technologically neutral and allows entry of multiple operational concepts, technologies, and service providers. This is called an "open system" because the state does not require nor administer a single approach to charging for road use. Security standards and privacy protections should be required, and data content messaging formats between service providers and the state may be defined. The open system

approach is intended to foster competition and innovation in both mileage measurement technologies and service provisions, as well as to hold costs in check by minimizing the possibility of vendor lock-in[11].

2.5. Technical & Organizational Design: Interoperability

The pilot implementation team should make every effort to test interoperability of California's road charge system with other states. With Oregon having the only operational road charge program, every effort should be made to test interoperability with Oregon's OreGo road charge system. In the event cooperation with OreGo proves infeasible, interoperability should be simulated using the commercial account managers that participate in California's pilot. By testing interoperability at this early stage, the California road charge pilot will provide the foundation for national interoperability of road charging systems.

2.6. Technical & Organizational Design: Pilot Composition

The pilot should include individuals, households, businesses, and at least one government agency to represent the diversity of the vehicle ownership types most common in California.

2.7. Technical & Organizational Design: Pilot Size

The pilot should include a cross-section of at least 5,000 vehicles that are reflective of the fleet currently using California's road network. The TAC recommends recruiting a variety of vehicles with the goal of forming a vehicle pool that reflects the diversity of the fleet, including alternative fuel and hybrid vehicles. More information on the vehicles and participant demographics developed and recommended by the TAC is summarized in Section 3.8.

2.8. Technical & Organizational Design: Road Charge Exemptions

The pilot should offer methods to exempt miles driven on private road or out of state. Both manual and automated options for claiming mileage exemptions for mileage on private and out-of-state roads should also be tested.

2.9. Privacy: Pilot Privacy Principles

The TAC adopted three privacy approaches to be implemented in the pilot: Governance, Accountability, and Model Privacy Protection provisions (model protection provisions). Under the Governance Approach, the TAC adopted specific California Road Charge Privacy Protection Principles. All aspects of the pilot program should conform to these principles. Under the Accountability approach, the pilot would be evaluated by an independent external evaluator against the privacy evaluation criteria. Finally, the TAC recommended model protection provisions for consideration, which are discussed further in Section 4.2.3.

2.10. Data Security: Pilot Data Security Provisions

The TAC adopted security features that should be incorporated in the pilot program. These features include authentication, authorization, data modification notification, data masking,

[11] Vendor lock-in is the situation in which customers are dependent on a single manufacturer or supplier for some product

encryption, data storage, data transmittal, data destruction, general IT network security and third party data security system verification.

2.11. Evaluation Criteria: Pilot Evaluation Criteria

The TAC adopted 50 evaluation criteria spanning 8 categories: Revenue, Cost of Administration and Collection, Operations, User Experience, Privacy, Data Security, Equity, and Communications. A summary of the criteria and suggested measures is provided in Section 5.

2.12. Enforcement and Compliance: Pilot Enforcement and Compliance Approach

The TAC specified eight approaches to check for anomalies in mileage reporting to be included in the pilot. A summary of the Enforcement and Compliance activities can be found in Section 6.

3. Policy Issues – Technical & Organizational Design

This section includes issues and recommendations related to the technical or organizational aspects of the pilot program design.

To arrive at recommendations related to the technical and organizational design of the pilot program, the TAC reviewed, discussed and deliberated over many policy issues related to road charging. Many of these issues were cited in SB 1077 as being necessary to resolve for the design of the pilot.

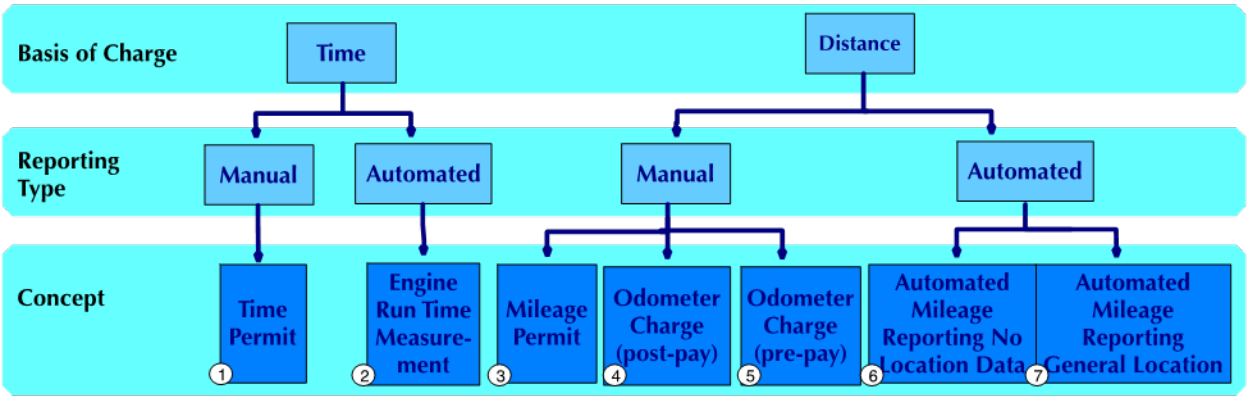
3.1. Manual and Automated Recording and Reporting

The TAC recommends that both manual and automated recording and reporting options should be offered in the pilot. SB 1077 addresses the need to identify alternative approaches:

> *The technical advisory committee shall study RUC [Road Usage Charge] alternatives to the gas tax. The technical advisory committee shall gather public comment on issues and concerns related to the pilot program and shall make recommendations to the Secretary of the Transportation Agency on the design of a pilot program to test alternative RUC approaches. The technical advisory committee may also make recommendations on the criteria to be used to evaluate the pilot program. [Vehicle Code 309(e)]*

The TAC considered a range of information regarding operational concepts for road charging. It considered a typology of road charge operational concepts, based on combinations of the basis of charge (time or distance) and reporting type (manual or automated). Of the seven operational concepts considered by the TAC, five are recommended for testing in the pilot program. These are summarized as follows (more detail on all operational concepts can be found in Appendix 4), with the five recommended concepts preceding the two that are not recommended:

Figure 4: Typology of Road Charge Concepts



Recommended Concepts:

Concept 1: Time Permit

A permit is issued by the state that allows a motorist unlimited road use in California for a specific period, such as a year, month or week. A common way to operationalize time permits is using stickers or decals.

Concept 3: Mileage Permit (pre-pay)

A mileage permit concept, similar to the time permit—except that its basis is distance traveled instead of time. Motorists purchase blocks of miles in this concept, instead of blocks of time. The license system in New Zealand for diesel vehicles is an example of a mileage permit system.

Concept 4: Odometer Charge (post-pay)

[Similar to Concept 3, except that] In a post-pay concept motorists remit payment after the miles are driven and the odometer is read. The odometer can be read by a state official or representative. Alternatively, the motorist could self-report the odometer reading, and random audits and other enforcement methods can be used to maintain compliance.

Concept 6: Automated Mileage Reporting with No Location Data

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

Concept 7: Automated Mileage Reporting with General Location

Vehicles are charged for distance with a rate that may vary by general location. SB 1077 requires a non-variable per-mile rate within the state, so the general location information would be used to prevent charging for miles driven out-of-state or on private lands. General location does not provide the level of detail that would be needed to estimate a motorist's locations street-by-street.

Concepts Not Recommended:

Concept 2: Engine Run Time

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

Engine run time did not seem very promising and was eliminated because it has never been tried before, off-the-shelf technology does not exist, and it could be seen to encourage unsafe driving behavior.

Concept 5: Odometer Charge (pre-pay)

[Similar to Concept 4, except that] In a pre-pay concept, motorists pay up front. It is similar to estimated income taxes, whereby taxpayers pay in advance based on estimated income and reconciled based on periodic odometer readings.

The pre-pay odometer charge was not recommended because it is very similar to the mileage permit, and it would be better to make the choice simpler for pilot participants by offering fewer choices.

The TAC's rationale for endorsing both manual and automated methods was as follows: automated and manual methods both have advantages and may appeal to different segments of the population. For example, manual methods may appeal to those who have greatest concern for privacy, while automated methods may appeal to those more attracted to technological methods and interested in the simplest method to receive credits for out-of-state travel or on private roads. Both manual and automated methods can potentially be offered together in a future road charging system.

3.1.1. A GPS-Based Option for Recording Mileage Should be Offered

The TAC recommends that a GPS-based option for recording mileage should be offered in the pilot. SB 1077 calls for the following related to location data:

> *In studying the road charge alternatives... the TAC shall take the following into consideration: availability, adaptability, reliability, security, protection of personally identifiable information, ease of recording and reporting, ease of administering collection of charges, effective methods of maintaining compliance, ease of re-identifying location data, and privacy concerns when using location data with other technologies.[Vehicle Code 3090(f)]*
>
> *At a minimum, the pilot program shall… analyze alternative means of collecting road usage data, including at least one alternative that does not rely on electronic vehicle location data. [Vehicle Code 3090(b)(1)]*

The TAC acknowledges that GPS could raise privacy concerns for some people, but recognizes that the conveniences available for GPS systems might appeal to others. Consequently, the TAC members decided that while non-GPS options will be tested—they also recommended testing GPS options.

3.2. Technologies for Further Study in the Road Charge Pilot Program

The TAC emphasized the importance of providing pilot volunteers with a variety of technology options, specifically emphasizing the importance of testing manual modes, not to the exclusion of more technological options. SB 1077 addresses technologies in the following sections:

> *The TAC shall study road charge alternatives to the gas tax…and shall make recommendations on the design of a pilot program…[Vehicle Code 3090(e)]*

At a minimum, the pilot program shall accomplish all of the following: (1) Analyze alternative means of collecting road usage data, including at least one alternative that does not rely on electronic vehicle location data. [Vehicle Code 3091(b)]

Ultimately since all technologies chosen seem promising, the TAC determined there was no reason to omit any from the pilot. The TAC recommends that the following technologies should be studied in the road charging pilot:

- Manual Technologies (technologies to support Time Permit, Mileage Permit, and Odometer charges)
- OBDII (On-Board Diagnostics) Mileage Meters (Usage-based Insurance Mileage Meters)
- Smartphone Mileage Meters
- Telematics Mileage Meters
- Commercial Vehicle Mileage Meters

Several TAC members expressed concern about the smartphone option, emphasizing that there must be protections to ensure that mileage is not lost because it is not recorded when the phone is not in the vehicle. More detailed information on the technology options can be found in Appendix 5.

3.3. Pilot Testing of Multiple Account Managers Program

The TAC recommends testing multiple account managers in the pilot. SB 1077 addressed account management in the following section:

3090(f)(4)(8): In studying the road charge alternatives… the TAC shall take the following into consideration: the ease… of administering the collection of taxes and fees as an alternative to the current system of taxing highway use through motor vehicle fuel taxes.

The TAC determined that in order to offer multiple account managers, it will be necessary to do the following before and during the pilot:

- Test/certify multiple account managers to ensure they are capable of performing account management activities
- Contract with multiple account managers
- Receive and process data from multiple account managers.

The potential advantages of including multiple account managers are as follows:

- Provides lessons learned for an open system, including how to enforce mileage recording and reporting across multiple account managers
- Provides an opportunity for private account managers who may want to participate to do so
- Provides participants account management options.

The potential disadvantage of including multiple account managers is that it may cost more to do so, at least in the pilot project, and it may involve more logistical challenges.

The TAC reasoned that testing multiple account managers simulates real world competition more accurately and gives pilot participants a feeling of choice.

3.4. Out-of-State Vehicle Owners Driving on California Roads

The TAC recommends that out-of-state vehicle owners driving on California roads should be included in the pilot, and that the range of operational concepts offered to visitors during the pilot should be limited to the time permit and general-location automated methods.

3.4.1. Out-of-State Drivers: Requirements under SB 1077

SB 1077 does not directly address out-of-state drivers, but it does direct the TAC to take into consideration "the ease… of administering the collection of taxes and fees as an alternative to the current system of taxing highway use through motor vehicle fuel taxes"[12]. Since out-of-state drivers currently pay motor fuel taxes (if they purchase fuel in California), the ease and cost of an alternative method of assessing road charge on visitors was considered by the TAC to be within its purview. This topic received numerous public comments, both in writing and at several TAC meetings, and emerged as a key theme during focus groups held summer 2015.

3.4.2. Out-of-State Drivers: Background

Under the current fuel tax collection system, passenger and commercial vehicles pay federal motor fuel tax on gasoline and diesel purchased in the U.S. In addition, all states levy state fuel taxes, and some jurisdictions levy regional and local fuel taxes. Tax is generally collected at the supplier level ("terminal rack"), and in the case of state fuel taxes, funds are retained in the state where the fuel was distributed.[13] The entities charged with collecting fuel taxes have been relatively unconcerned about whether the fuel purchased is consumed within their boundaries and make no attempt to balance revenue generated with miles driven across jurisdictional boundaries. Except in a few extreme cases (such as towns along state or international borders where visitors may travel with the exclusive objective of purchasing fuel across the border at lower prices, then return to their homes), the general public does not perceive or complain of any inequities in this roadway funding system. Whether this is due to perceived equity (e.g., "it goes both ways") or a more fundamental lack of awareness that any fuel taxes are even being paid, most people and policy makers seem to be comfortable with the status quo.

By contrast, both elected officials and the general public have indicated concern that under a road charge system visitors may not be charged for use of a host state's roadways. Some members of

[12] Senate Bill 1077 Section 3090(f)(4)

[13] Fuel purchased for use by interstate commercial vehicles is treated somewhat differently. Since 1986, when the International Fuel Tax Agreement (IFTA) was launched, interstate commercial vehicles report fuel purchased and consumed, and distance traveled state by state (and in ten Canadian provinces) to the IFTA administrators of their home jurisdictions. This reporting occurs on a quarterly basis. Fuel taxes owed (or refunds due) are calculated using the differential fuel tax rates for each of the jurisdictions in which travel was undertaken and fuel purchased. A national clearinghouse operated by IFTA, Inc. then reconciles fuel taxes due/owed by each participating jurisdiction.

the public expressed questions about the fairness, or lack thereof, of only California residents contributing to road maintenance funding.

The “visitors drive free” scenario may or may not materialize in a road charging system, depending on the policies, tax systems and reciprocity agreements established within and between various jurisdictions. The provisions made to address the issue will likely influence public acceptance of the road charge system as well as the balance of highway maintenance funding in surrounding states. Indeed, the opportunity for visitors to California to buy tax-free fuel and pay no additional fees to use a roadway could potentially entice tax evasion.

TAC discussions regarding out-of-state drivers included the following:

- Equity — Will California motorists unfairly subsidize road use by out-of-state motorists?
- Enforcement — How will the state compel out-of-state motorists to pay for use of California roads when the gas tax is no longer in place?
- Fiscal sustainability — Will the state be capturing all the revenues it should?

3.4.3. Out-of-State Drivers: Public Comment

This design recommendation received a significant amount of public comment. A letter submitted by CalTax suggested that a small sample of out-of-state motorists should be included in the pilot, and that “TAC should ensure that the tax burden for financing roads does not shift to California motorists”.

3.4.4. Out-of-State Drivers: Synopsis of Reasoning for Recommendation

The TAC had four reasons for recommending inclusion of out-of-state drivers in the pilot:

- To determine whether charging out-of-state drivers is possible.
- To test different methods of charging out-of-state drivers to assess simplicity and effectiveness.
- To test a bilateral revenue reconciliation system with other states (although it will be a unidirectional system to start because Oregon has chosen not to assess a road charge on visitors).
- To test the capabilities of Commercial Account Managers to measure and assign mileage in more than one jurisdiction.

3.4.5. Out-of-State Drivers: Issues to Monitor in the Pilot Project

The primary issues to monitor throughout the pilot are (1) the ease of compliance by out-of-state drivers, and (2) the ability of the Commercial Account Managers to correctly assign miles and calculate road charge by jurisdiction.

3.5. The Road Charge Pilot Program Should Use an Open System

The TAC reviewed the following material, which provides a comparison of the characteristics of closed and open systems as well as examples from the transportation and telecommunications sectors to inform discussions and ultimately decisions about this issue. Closed and open systems are defined as follows:

- Closed System: An internally integrated system controlled by a single entity with essential components that cannot be substituted by other external components, which could perform the same functions.
- Open System: An integrated system based on common standards and an operating system accessible to the marketplace whereby components performing the same function can be readily substituted or provided by multiple providers.

The bullet points below characterize closed and open systems in the context of road charging:

- A closed system for road charging is a self-contained system in which one organization selected by the state provides all user hardware. Another organization—a state agency or an organization selected by the state (perhaps the same organization as the hardware provider)—manages user accounts and remits collected charges to the state.
- An open system for road charging would allow multiple organizations to participate in a manner that approximates a free or open market. In an open system, any qualified company could provide mileage reporting hardware, and another group of qualified companies could provide account management services to motorists. Certified companies are free to enter the market, so long as their equipment or services meet standards set by the state.

An open system is one that is based on common standards. Because the standards are open, and not proprietary, equipment from one vendor can be readily substituted for equipment from another vendor.

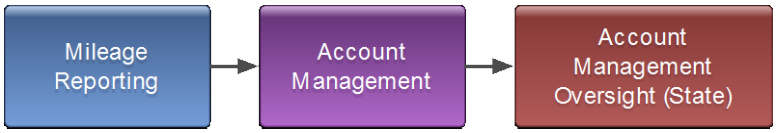
- In an open road charging system, motorists would have accounts and submit payment for transportation services to a road charge account manager of their choice. The road charge account manager would forward payment to the state. Road charge account managers may offer additional services that appeal to motorists such as usage-based insurance.
- In order to create an open system, standards must be chosen, at a minimum, for devices used in the system and software used in system interfaces. An organization, called a certification entity, would verify whether each participating firm meets the standards and can thus participate in the system.
- To procure an open system, the state must specify an architecture, develop standards or requirements for each component of the architecture, and open a market for each component.
- Due to its size, with millions of vehicles, California is likely to be able to support a profitable open system for hardware vendors.

The TAC recommends that an open system be used in the road charge pilot. Closed systems have the potential for limiting competition, raising prices, and limiting technical development, while open systems have the potential for lower prices and greater customer service when operated on a large scale. Given the number of California motorists, testing an open system in the pilot makes sense.

3.5.1. Example of an Open System Architecture for Road Charging

The system architecture proposed here is analogous to the cell phone industry. In-vehicle road charge devices that measure distance traveled are analogous to cellular phones such as those offered by Samsung, Apple and Nokia, while road charge account managers are analogous to wireless carriers such as AT&T, Sprint and Verizon.

The system architecture proposed would have the three main subsystems described below. All subsystems could support both GPS and non-GPS options. However, for manual operational concepts, motorists would interface directly with the account management subsystem, while for automated concepts, the mileage reporting interfaces with account management.



1. Mileage reporting: the subsystem that reports data from the vehicle to the account manager. This subsystem would include in-vehicle devices and any off-vehicle IT systems needed to translate data to the open standard for communications. The mileage reporting subsystem would not be used for manual methods such as the time permit or the odometer charge, as these do not require the use of vehicular data or in-vehicle electronics.

2. Account management: the subsystem that takes in mileage data, updates user accounts based on mileage data, sends invoices to customers, receives payment from customers, sends payments to the state, and reports road charge data to the state accounting system. Account managers would accept input from motorists opting for manual methods directly.

3. Account management oversight: the subsystem that takes road charge data from the account management subsystem and verifies that all vehicles are registered in the program, all account managers are paying appropriate sums of money to the state each month, and all account managers are abiding by the rules of the program.

In practical terms, in a closed system, the pilot would have one single vendor that would provide all of the methods that are chosen by the TAC. An open system would define a standard by which all the potential vendors would create their services and then the pilot would include at least two, but potentially more. Selecting an open system would set a precedent that the state may choose to follow in any future or potential road charging legislation.

Concerns that private companies could have the potential to make excessive profits by offering public payment services in an open system were discussed. It was determined that as long as future regulation ensures that customer charges are not excessive, it could be possible for such a public-private partnership to provide good value to customers. This should be observed during the pilot and ensured in law should a road charge be considered subsequent to the pilot.

TAC recommends that open systems should only be used when the right safeguards are in place.

3.6. Test Interoperability with Other States Considering Road Charges in the Road Charge Pilot Program

The TAC recommends testing interoperability with other operational road charges but not toll systems. SB 1077 addresses interoperability in the following section:

> *In studying the road charge alternatives… the TAC shall take the following into consideration: the ease… of administering the collection of taxes and fees as an alternative to the current system of taxing highway use through motor vehicle fuel taxes. [Vehicle Code 3090(f)(4)(8)]*

The TAC reviewed the following:

- Interoperability can be defined as the ability of different information technology systems and software applications to communicate, exchange data, and use the information that has been exchanged. From a driver's perspective, it is the ability to use a single road charge concept to record and report miles driven across more than one jurisdiction or road charge system, without having to change devices, technologies or account managers, and without any manual intervention on the part of the driver.
- To demonstrate interoperability, participants already registered for a road charging pilot program using their own state's version of Operational Concept 7 (Automated Mileage Reporting with General Location) could be directly added to the California program.
- At the time of writing, Oregon is planning to have such participants enrolled in a system with multiple commercial account managers prior to the start of the California pilot. It now appears unlikely that other states will have programs or pilots operational at the time of the California pilot.
- A California pilot participant could drive in other participating state(s) and pay one bill for travel on public roads in all states. Likewise, participants from other states could drive in California and pay one bill for travel on public roads in all states.
- Interoperability would require data exchange among participating states (which motorists travel and how many miles in which states), and a simulated financial exchange (a computation of reconciled funds owed between states).
- A simple way, but not the only way, to accomplish interoperability with Oregon would be to use one or more of the same account managers that are being used in Oregon and are California certified, although the Oregon program will be open to other providers in the near future.

The TAC considered the idea that any potential future road charge system would need to cover out-of-state drivers. Hence, interoperability with other road charges would support this and provide greater customer convenience to drivers from both states. Therefore, the TAC concluded that testing interoperability with other road charging systems would verify convenience for drivers from out-of-state. The TAC's privacy and data security recommendations in sections 4.2 and 4.3 apply equally to motorists who are testing interoperable road charging with other states.

The TAC considered and determined that tolling uses are fundamentally different technologies than road charging. Since no money will change hands in the pilot, interoperability with tolling is

challenging to test. As a result, the TAC does not recommend testing interoperability with tolling facilities.

3.7. Types of Participants to be Included in Road Charge Pilot Project

The TAC recommends the pilot include individuals, households, businesses and at least one government agency. The TAC determined that inclusion of these groups is important to represent the diversity of vehicle ownership, including alternative fuel and hybrid vehicles, across California.

Material reviewed included extensive demographic data about California, including the population and number of households by location, and number and location of businesses. In addition, the TAC reviewed recent data from the Department of Motor Vehicles (DMV) for the number and distribution of registered vehicles in the state, including private, commercial and agency vehicles.

Public and stakeholder comments were supportive of the recommendation to test a wide range of participant types. Below are three examples.

- "Include the broadest group possible into the pilot project". – CalTax.
- "Open participant recruitment statewide with specific demographic and economic recruitment goals is the only option. Yes, it will make the pilot more difficult to implement, but that is exactly what the state will face on a much larger scale should they adopt this model". – San Joaquin Farm Bureau Federation.
- "…supportive of a robust pilot, … covering a range of vehicle types, area types, and traveler/fleet characteristics that could be accommodated in a permanent program". – San Bernardino Association of Governments.

TAC members disagreed over the level of importance of distinguishing between an individual and a household. Some reasoned that all individuals belong to a household, such that distinction was trivial. Others argued that a complete household, regardless of its makeup, was distinct from an individual and should be tested as such. For example, a complete household may own several vehicles, share vehicles among individuals and face varying driving circumstances and metering and billing preferences. Ultimately, the distinction was affirmed for the pilot.

There are two key issues to monitor related to this recommendation. First, it is important to distinguish carefully between an individual, household, business or agency, and the vehicle(s) that belong to these entities. Since there is often a one-to-many relationship between owner and vehicle, and occasionally a many-to-one relationship between owner and vehicle, it would be important to carefully define which vehicles are associated with entities for purposes of evaluating the pilot. Secondly, it will be important to distinguish between businesses based on sector, location in the state and other qualities that reflect the diversity of businesses in California.

3.8. Number and Distribution of Participants in the Road Charge Pilot Program

The TAC recommends that the pilot include a cross-section of a minimum of 5,000 vehicles that are reflective of the fleet currently using California's road network. A matrix illustrating participant distribution can be found on the following page (Figure 4).

Figure 4: Participant matrix

		North	Central	South	Trucks
Commercial Vehicles (Businesses)		100	50	175	50
Private Vehicles (Individuals & Households)					Other
Urban & Suburban	$	475	175	1050	125
Urban & Suburban	$$	475	175	1050	
Rural & Agricultural	$	200	200	150	
Rural & Agricultural	$$	200	200	150	

The TAC reviewed demographic material about California and several iterations of a participant matrix to arrive at a recommendation. Demographic data included the following (more detailed demographic material can be found in Appendix 6):

- Geographic distribution of the state's population according to several definitions of urban vs. rural. A number of definitions were considered. After consideration at two meetings, the TAC recommends that the urban/suburban be defined as U.S. Census Urban Areas and Urban Clusters, while rural/agricultural be defined as "everything else". Participants may additionally self-select their location as one or the other, which is in line with recommendations of several stakeholder groups, including the following:
  - California State Association of Counties
  - League of California Cities
  - Regional Council of Rural Counties
  - Rural Counties Task Force
- Income distribution across the state. The TAC considered several methods of classifying California residents based on household size and income. The classification ultimately adopted varies by county based on categories determined by the California Department of Housing and Community Development.
- Location of businesses around the state, including concentrations near population centers.
- Estimate of the number and population of truck fleets by size and sector.

In addition, the TAC reviewed several versions of a "matrix" that summarized the key participant sub-groups for the pilot and target participant. Following extensive comment-and-response from TAC members and deliberation at two meetings, the TAC ultimately adopted the participant matrix (Figure 4), indicating both the minimum number and distribution of participants for the pilot project.

Comments received from stakeholder groups and the public were generally supportive of the TAC's decision to recommend a large, statewide pilot with diverse participation:

- "We'd encourage the Advisory Committee to implement a pilot program that analyzes all vehicles within the [light-duty] classification... Whether using gasoline, electricity, hydrogen, or other, all vehicle types use our roads and apply daily stress and strains to the infrastructure below; and should therefore bear some financial responsibility to its maintenance." – California Building Industry Association

- "Agriculture needs to be represented in the discussions." – Tulare County Farm Bureau

- "An equitable road user charge should be just that: a charge for all vehicles that drive on the system". – Self-Help Counties Coalition

- "In addition to variation in commercial fleet size sampling for the road charge pilot as suggested in the briefing books, some consideration should be given to variations in market segmentation for commercial vehicles". – Southern California Association of Governments

- "There needs to be adequate participation of a variety of interests reflective of the local socio-economic forces in each county represented… There are such vast differences in each county in our state. All of those need to be considered, not just focus on a few select locations as this could potentially apply to the entire state in the future". – San Joaquin Farm Bureau Federation

- "SANBAG is supportive of a robust pilot, … covering a range of vehicle types, area types, and traveler/fleet characteristics that could be accommodated in a permanent program. We concur that a mix of rural and urban drivers is important to include in the pilot. In addition, we believe that the inland areas of Southern California need to be adequately represented… this should include a cross-section of vehicle types, from conventional to alternate fuel vehicles… If trucks are included… we would suggest that the pilot include both fleets and owner-operators." – SANBAG

A statistically significant pilot sample would require only about 400 participants. Statistical significance is a concept that provides assurance that the results of testing a hypothesis about a sample are valid across the broader population represented by the sample. However, the TAC recommends recruitment of as diverse a field of pilot participants as possible, reflective of the state as a whole and robust enough to understand user experiences across a wide range of operational, policy, and perceptual issues related to road charging. Recruiting only 400 participants would probably not result in meaningful participation from many of the regions and population sub-groups that the TAC identified as important to consider (e.g., low-income participants) and/or sub-groups that explicitly expressed interest in participating (e.g., agricultural regions). It likely would also not allow robust testing of the full range of operational concepts the

TAC recommends studying. Instead, the TAC considered the notion that a sample becomes "saturated" when adding one participant to the pilot would not appreciably change the results or add new information.

The following issues were discussed before arriving at the recommendation of the participant matrix:

- Low vs. very low income. Initially, the matrix recommended three income categories within each location and region of the state. However, after further consideration, including the fact that the population of the three income groups could not reliably be determined, the TAC achieved consensus on using only two income groups: above and below median. At the same time, the TAC recommended ensuring at least 25% of participants be drawn from the Very Low income classification, per Department of Housing and Community Development guidelines.
- There was debate over how to classify urban and rural participants. Some members argued for using a state agency definition, while others argued for using definitions for each county. Given the proliferation of plausible definitions, and the fact that many counties contain both rural and urban areas, a definition was ultimately agreed upon based on total population and population density of a place.
- In order to properly hit each target, it will be necessary to seek income information, which may be sensitive for some participants. To mitigate this, the TAC recommends making the provision of precise income information by participants optional and offering participants the option of choosing from a range of incomes in order to categorize their income level for purposes of the pilot.
- As part of a broader discussion about the overall pilot design, concern was expressed that dividing the volunteer pool into too many sub-populations (of which out-of-state drivers is one) has the potential to dilute the information garnered from the pilot.
- There are transportation challenges in rural areas that include but are not limited to farmworkers. The TAC recommends that best efforts be made to ensure that a statistically adequate sample of farm workers, as well as other rural stakeholders, are included in the pilot.

Issues to monitor include the following:

- It will be important to carefully account for enrollees in accordance with the matrix.
- It will also be important to distinguish between vehicles and participants by defining a one-to-one relationship between each such that the demographic and vehicle targets can simultaneously be achieved.

3.9. Mileage Exemptions from Road Charging

The TAC recommends that the pilot offer methods to exempt miles driven on private roads and out of state. Both manual and automated options for claiming mileage exemptions should be tested.

3.9.1. Mileage Exemption: Background

Under a potential future operational road charging system, policy makers may opt to exempt any number of road uses from paying the road charge. For instance, a new system could mirror the current law and exempt mileage driven in the operation of farming or other equipment on private property (a specific use off the public road network). This is currently accomplished through a request for refund of tax paid. Alternatively, it could opt to assess charges for only those miles driven on California's public roads, not on private roads (whatever the industry or use) or outside the state, by either not charging for those uses, or charging but providing a mechanism for rebates or credits (similar to the current system for farming operations).

In light of this, the TAC determined that it would be helpful to test one or more mechanisms for exempting payment of some mileage driven during the pilot to provide information for future decision-making on the topic. For the purposes of a pilot test, the TAC considered both *road uses* subject to exemptions and *mechanisms* for claiming exemptions. Road uses include activities like driving on private roads, driving out of state, driving off-road and driving on tribal lands or federal military bases. Exemption mechanisms discussed included using location-aware devices that differentiate between in-state and out-of-state miles driven, offering a standard mileage deduction for each vehicle (for instance 250 miles per year for all drivers), and offering a refund form similar to that currently in use for agricultural exemptions from motor fuel taxes.

Under a scenario in which exemptions for using private roads or out of state roads are offered, pilot participants who opt for a location-based device would simply not be charged for their non-state road travel. Those who do not choose such a device could be given the option to receive a refund for non-state-road mileage based on documentation they would provide in a refund request, such as out-of-state fuel receipts, detailed mileage logs and other documentation such as property records.

3.9.2. Mileage Exemption: Public Comment

Public comments were received that (1) drivers should not lose exemptions they currently enjoy, such as exemptions for agricultural (off-road) use; and (2) the system should not charge for the use of roads that already have non-state funding sources in place. The California Building Industry Association submitted public comment suggesting that the TAC give "thought as to how 'private' roads might be exempted from the road user charge" as they already have non-state revenue sources in place. Another public comment questioned whether credit would be given for out-of-state miles driven.

3.9.3. Mileage Exemption: Synopsis of Reasoning for Recommendation

The TAC based its recommendation on the following:

- Since the road charge is intended as a replacement for the gas tax, any exemptions currently afforded under the gas tax should be extended to the road charge.
- Those participants who opt to use a fully manual recording/reporting system will have to maintain documentation and submit requests for either exemptions or refunds of fees paid.
- Privacy implications of both the automated and manual exemption methods.

There were no dissenting opinions to the proposal that certain categories of road use should be exempted from the road charge, however, one TAC member suggested extending the exemptions available to address economic equity concerns. This suggestion was not moved forward by a majority vote of the TAC.

3.9.4. Mileage Exemption: Issues to Monitor Throughout Course of Pilot Project

The three key issues to monitor throughout the course of the pilot related to the mileage exemption include the privacy implications, the reporting burdens and opportunities for fraud.

4. Policy Issues – Privacy and Data Security

Californians expect to be protected from unwanted access by others, whether physical access, access to personal information, or unwanted attention[14]. In fact, California is one of only eleven states that has adopted privacy-related provisions in the state constitution creating an inalienable right to privacy – a protection stronger than provided under the U.S. Constitution.

Advances in technology, software and the Internet have led to new and pervasive ways to collect, aggregate, disseminate—and sometimes misappropriate—private information. Yet the transportation system increasingly relies on new technologies and applications to manage the flow of traffic, provide motorist safety and pay for the upkeep of the system. High-resolution cameras, thermal imaging, radar, all-electronic toll transactions, and in-vehicle GPS-based navigation systems are just a few examples of emerging technologies that raise privacy concerns related to the collection and use of personal data.

As a world leader in the development of new technologies and electronic services, and with 38 million people holding their inalienable state constitutional right to privacy (and an expectation that it be protected), California is at the crossroads of technology and personal privacy protection. With this firmly in mind, the TAC has aimed to recommend the strongest personal privacy and data security protection regimen possible for the pilot and any future implementation of road charges in California.

The term "personal information" as used by the TAC is broader than the term "personally-identifiable information." Personal information means any information about an individual which, on its own or when combined with other information, is reasonably capable of revealing the identity or activities of a specific person. Personal information includes, but is not limited to: trip making details, address, telephone number, email address, license plate number, driver's license number, California identification card number, account number, social security number, photograph, bank account information, or credit card number.

4.1. Requirements Under SB 1077

SB 1077, authorizing the California road charge pilot program, contains several provisions pertaining to personal privacy protections and the related topic of data security that guided the TAC's recommendations. Section 1 of the legislation (legislative findings and intent section) makes clear that:

> *Privacy implications must be taken into account, especially with regard to location data. Travel locations or patterns shall not be reported, and legal and technical safeguards shall protect personal information.*

[Section 3090] of SB 1077 directs the TAC's pilot design recommendations to consider:

- The necessity of protecting all personally identifying information used in reporting highway use;

[14] Adopted from "Privacy and the Limits of Law," Ruth Gavison, Yale Law Journal, at page 428. (1980).

- The ease of re-identifying location data, even when personally identifiable information has been removed from the data;
- Increased privacy concerns when location data is used in conjunction with other technologies; and
- Public and private agency access, including law enforcement, to data collected and stored for purposes of the road charge to ensure individual privacy rights are protected pursuant to Section 1 of Article I of the California Constitution.

In addition to directing that certain privacy and data security-related issues be considered by the TAC, SB 1077 (Vehicle Code 3090) provides clear specifications for how the pilot program must be implemented by the State Transportation Agency (CalSTA). The road charge pilot program must:

- Collect a minimum amount of personal information, including location tracking information, necessary to implement the road charge pilot program;
- Ensure that processes for collecting, managing, storing, transmitting, and destroying data are in place to protect the integrity of the data and safeguard the privacy of drivers; and
- Ensure no public or private agency of the pilot does not disclose, distribute, make available, sell, access or otherwise provide for another purpose personal information or data collected through the road charge program to any private entity or individual unless authorized by a court order, as part of a civil case, by subpoena issued on behalf of a defendant in a criminal case, by a search warrant or in aggregate form with all personal information removed for the purposes of academic research.

Finally, at the conclusion of the pilot project, CalSTA must submit a final evaluative report that discusses the issues of:

- Privacy, including recommendations regarding public and private access, including by law enforcement, to data collected and stored for purposes of road charging to ensure individual privacy rights are protected pursuant to Section 1 of Article 1 of the California Constitution; and
- Data collection technology, including a discussion of the advantages and disadvantages of various types of data collection equipment and the privacy implications and considerations of use of the equipment.

4.2. Privacy Protection Recommendations

To ensure compliance with SB 1077, the TAC considered and deliberated the specific personal privacy protections to be used in the pilot program and recommends that the pilot should feature three different approaches for protecting privacy: governance, accountability and model protection provisions. Each of these approaches is described in detail below.

4.2.1. Governance Approach: Road Charge Privacy Protection Principles

This approach is a holistic governance approach that relies on the application of high-level Privacy Protection Principles to govern all decisions throughout the entire road charge program lifecycle:

design, implementation, operations, independent evaluation, wind down and reporting of pilot program activities.

The following California Road Charge Privacy Principles are recommended:

1. The Road Charge pilot must at all times recognize and respect an individual's interests in privacy and information use pursuant to Section 1 of Article I of the California Constitution.
2. The Road Charge must offer motorists a time-based system of paying for road use as an alternative payment method for individuals concerned about disclosing their mileage driven.
3. The Road Charge must allow motorists choice in how mileage will be reported.
4. The Road Charge system must be designed, implemented and administered in a manner transparent to the public and to individual motorists.
5. The Road Charge system must comply with applicable federal and state laws governing privacy and information security.
6. Personal information required for the Road Charge system must not be disclosed to any persons or entities without motorists' consent, specific statutory authority authorizing disclosure, appropriate legal process or emergency circumstances as defined in law.
7. The Road Charge system must not collect information beyond what is needed to properly calculate, report and collect the road charge, unless the motorist provides his or her consent.
8. Road Charge system data retained beyond the period of time necessary to ensure proper mileage account payment must have all personal information removed and may only be used for public purposes (i.e., improving the safety and efficiency of the traveling public).
9. Motorists who choose to release personal information must provide their consent in a clear, unambiguous, written manner.
10. The Road Charge system must not require use of specific locational information, including specific origins or destinations, travel patterns or times of travel.
11. The Road Charge system must allow motorists an opportunity to view all personal data being collected and stored to ensure only data required for proper accounting and payment of road charges is being collected and retained.
12. The Road Charge system must investigate all potential errors identified by motorists and make all corrections to ensure road charge records remain accurate.

4.2.2. Accountability Approach: Road Charge Privacy Evaluation Criteria

The Accountability Approach calls for an Independent Evaluator to evaluate the road charge pilot program's performance against a set of specific privacy protection criteria, much like a performance audit. The evaluation criteria (see Section 5, and provided in detail in Appendix 7)

will be used to assess performance of the pilot relative to SB 1077's requirements detailed in section 4.1 above; against the privacy protection principles described in section 4.2; against the privacy evaluation criteria adopted by the TAC (described in Section 5); and against the model protection provisions described in section 4.2.3.

In the event a road charge system were implemented statewide, beyond the pilot, this Accountability approach could be applied and carried out periodically (e.g., biennially). The TAC notes that in a full program, additional evaluation processes might also be employed.

4.2.3. Privacy Protection Provisions Approach: Road Charge Model Privacy Protection Provisions

The Privacy Protection Provisions Approach calls for the design, implementation and operation of the road charge pilot program to be developed primarily through model privacy protection provisions.

Since the TAC cannot unilaterally enact Privacy Protection Provisions in law, and since the model Privacy Protection Provisions are not proposed for legislative or agency enactment prior to commencing the pilot program, the TAC intends that these provisions be incorporated into contracts with private vendors wherever feasible and that other provisions be simulated to test their effectiveness during the pilot. If successful during the pilot, these provisions could serve as a useful reference point for action by the California legislature, adoption by a state agency via rulemaking, or incorporation into contractual terms with future road charge private vendors.

The full Model Privacy Protection Provisions are found in Appendix 8. Provision development was influenced by these sources:

- Key provisions found in **SB 1077, authorizing the Road Charge pilot program**.
- **TAC discussions** and input.
- Key provisions found in California's **Electronic Toll Collections law**.
- Key provisions found in California **SB 34 (Hill, Statutes of 2014)** related to **use of locational data**.
- Key provisions found in California's **Online Privacy Protection Act**.
- TAC member recommended **Road Charge Privacy Principles**.
- **Best practices from other jurisdictions** that have specific privacy protections in a road charge program.
- **Data Security provisions** recommended by TAC members (detailed later in this Section 4.3).

Perhaps the most powerful privacy protection measure can be found in the TAC's recommendations related to how motorists would pay for their road use. TAC decisions to allow motorists (a) the option of paying for time instead of miles, and (b) choices for how mileage information will be collected, are two of the most powerful privacy protections that can be

provided.[15] Thus, the degree of privacy protections afforded in California's pilot might also be viewed from the overall system perspective. Allowing motorists the option to simply purchase a time permit that is no more revealing than the current requirements to register a vehicle in California is a valuable option for people who are opposed to reporting any mileage data and are willing to pay for unlimited roadway miles in California.

4.2.4. Additional Viewpoints, Discussion and Issues to Monitor Regarding Privacy Protection

Privacy issues were consistently identified and discussed at each of the TAC meetings and in several subcommittee sessions. The TAC would like to draw special attention to the following privacy aspects that are addressed in the three privacy protection approaches but may not be obvious in the first reading of the recommendations:

- **Privacy of all personal information must be protected – not just Personally Identifying Information**. The TAC's recommended privacy protections treat all personal and sensitive information as critical to protect. Most privacy policies (even very strong ones) commit only to the protection of information that identifies a specific individual, such as their name, address, etc. The TAC's recommendations as embodied in the Model Privacy Protection Provision approach (see Appendix 8) would apply to all personal, sensitive information – such as vehicle license plate numbers, city or county of residence, etc.

- **Privacy protections must be more than strong sentiments -- there must be an affirmative public duty to protect privacy and a specific public official charged with upholding this duty.** Based on the advice of TAC experts in privacy law, the model privacy provisions (Appendix 8) must contain more than strong provisions, or else they may become dormant, not monitored and not enforced by the public agency. The TAC's privacy recommendations have been bolstered by creating this duty and requiring the chief information technology officer of the road charge agency to serve as steward of the privacy principles.

- **Violations of the privacy protections must be actionable by motorists**. In considering a road charge system for the future, the privacy protection measures should allow motorists the ability to compel adherence to the privacy protection provisions through administrative and/or legal processes. This will help ensure that the public agency charged with enforcing the privacy protections would remain vigilant in its duty.

- **Enforcement measures are worth monitoring**. The TAC recognizes that enforcement measures in the pilot cannot fully simulate the level of enforcement required in a live road charge system that must collect taxes from all drivers on California's roadways. The TAC also cautions that personal privacy is often at stake when the government conducts enforcement activities of any kind. Therefore, the TAC urges that the design of any future

[15] These design principles align with the views of FTC Chairwoman Edith Ramirez, who is a leading watchdog for privacy and data security practices. *C.f.*, "Internet of Things Demands Security by Design," CIO.com, January 8, 2015. http://www.cio.com/article/2866679/security-and-privacy/internet-of-things-demands-security-by-design.html

road charge enforcement regime carefully adhere to the privacy principles and that privacy issues should continue to be monitored.

4.3. Data Security Requirements Recommendations

Personal privacy and data security are related but distinct concepts. Transfer of private information does not necessarily constitute an intrusion of privacy. For example, a person might agree to release private information to another party for a specific purpose (e.g. disclosing their annual salary to a bank to qualify for a loan). Even though the bank now possesses sensitive personal information, privacy has not been compromised because access is not unwanted. However, if adequate data security protections are not in place, and unauthorized parties access that information, the owner's personal privacy is breached due to poor data security.

The reverse of this situation can also be true: even if effective data security protections exist, if the original means of obtaining personal information is overly intrusive, personal privacy may be compromised. For example, if a law enforcement agency stores personal identifying information on computers that utilize the highest levels of encryption and access control policies, that data is considered secure. However, if the agency collected information by searching a person's personal files without a search warrant, personal privacy has indeed been breached, even though the data is secure.

The distinction between personal privacy and data security is highlighted here because the legal, technological and policy protections will be different for each.

SB 1077 addresses data security in the following section:

> *Public and private agency access, including law enforcement, to data collected and stored for purposes of the road usage charge to ensure individual privacy rights are protected pursuant to Section 1 of Article I of the California Constitution. [Vehicle Code 3090(f)(8)]*

The TAC reviewed and adopted the main components of data security, as identified below[16], for more detailed information on data security measures see Appendix 9.

During the discussion on data security the issue related to the testing of financial transactions during the pilot was raised. The TAC concluded that seeing that there will be no exchange of funds during the pilot, testing data security related to financial transactions will not be conducted.

The TAC made the following recommendation(s) on data security requirements to be used for the pilot. These recommendations are based on industry standards for online financial-grade transactions requiring data security. Statute requires recording the "minimum location data" necessary to support the road charge.

1. **Authentication**: minimum of 8-character passwords, letters and numbers, one capital, require periodic password change.

[16] Hiner, J. Security hinges on authentication, authorization, and encryption. TechRepublic: August 14, 2002. Available at: http://www.techrepublic.com/article/security-hinges-on-authentication-authorization-and-encryption/

2. **Authorization**: for pilot project, employ user roles with limited rights to personally identifiable information access. Provide at least user roles of Customer Service Representative, Enforcement and Accountant/Auditor.
3. **Data Modification Notification**: require data modification notification to motorist or primary account holder (in the event of vehicle fleets) via e-mail or text message.
4. **Data Masking**: at a minimum, mask all means of simulated payment and VINs [Vehicle Identification Numbers].
5. **Encryption**: use 256-bit Advanced Encryption Standard encryption.
6. **Data Storage**: use 256-bit Advanced Encryption Standard to encrypt primary and backup data; at Account Manager and Account Management Oversight, store location data only in Mileage buckets[17].
7. **Data Transmittal**: use mileage buckets to transmit mileage data to Commercial Account Managers; use 256-bit Advanced Encryption Standard for encryption.
8. **Data Destruction**:
   - Opt-in option for all participants to preserve data for purposes of pilot data analysis.
   - For those who do not opt in, destroy mileage data within 30 days after latest of:
     - Simulated payment processing,
     - Simulated dispute resolution, or
     - Simulated noncompliance investigation.
   - Data on devices destroyed when data receipt confirmation received from account manager
9. **General IT Network Security**: use ISO [International Standards Organization] 27000 best practices (although full system certification and audits will not be possible during the pilot).
10. **Third-party data security system verification**: a third party should be engaged to verify that all other data security provisions are followed during the pilot.

[17] Mileage buckets are running tallies of mileage in distinct general charging areas, e.g.: miles driven to date on California public roads; miles driven to date in California off of public roads; and miles driven out of state. This means of mileage storage stands in contrast to storing miles associated with specific location data.

5. Evaluation Criteria

Evaluation is the measurement and analysis of the performance of a policy, system, program or investment. It is a critical aspect of any policy innovation effort. The purpose of establishing evaluation criteria is to accomplish the following:

- Meet policy objectives and stakeholder needs,
- Be measureable (qualitatively or quantitatively) within the scope of the pilot,
- Provide useful feedback to policy decision makers,
- Provide useful feedback to potential road charging implementers and administrators, including potential private sector partners,
- Be useful beyond the pilot phase for potential ongoing evaluation of a live system, and
- To the extent possible, avoid conflict or large overlaps, which could cause confusion.

5.1.1. Evaluation Terminology

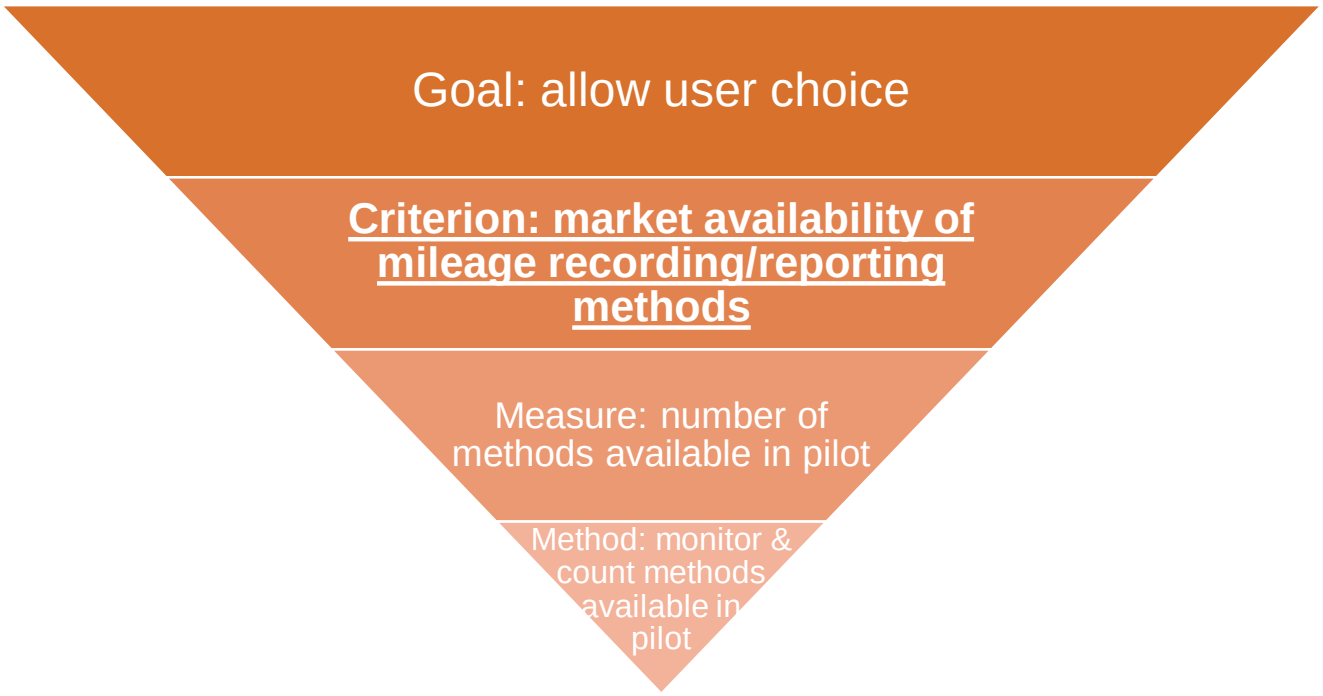
Evaluation terminology is often a source of confusion due to the many words that can describe the same or substantially similar concepts. The list below is intended to clarify terminology and to ensure that evaluation discussions and activities in California's Road Charge pilot program are carried out in a consistent manner.

- Goal: intended result or outcome of an effort, program or project
  - Example: a sustainable revenue source for California transportation
  - Synonyms: objective, aim, end, purpose, intention
- Criterion: a standard against which to judge performance (note: criteria can be qualitative or quantitative, precise or vague)
  - Examples: user friendliness, ease of recording, adequacy of privacy protection
  - Synonyms: benchmark, norm
- Measure: a calculation, measurement, or observation that indicates the value of a performance parameter (note: can be qualitative or quantitative and binary, discrete, or continuous)
  - Examples: number of options offered, user descriptions of ease of use
  - Synonyms: gauge, index, barometer, indicator, metric
- Method: the means by which data are gathered and analyzed to create a measure (can be quantitative or qualitative)
  - Examples: user surveys, interviews, quantitative data collection and analyses, consensus-based discussions
  - Synonyms: way, approach

To summarize: evaluation involves the use of methods to calculate or characterize measures to assess performance against criteria to determine how well the pilot project achieves goals.

The graphic below illustrates an example of how goals, criteria, measures and methods relate. For example, if a goal is to "allow user choice" in mileage recording and reporting methods, then one corresponding criterion for that goal is "market availability of methods". In order to assess performance against this criterion, one measure is "number of methods available in the pilot". Finally, monitoring and counting the reporting methods available at various points during the pilot project is a method that can be used to calculate the measure.

Figure 1: Hierarchy of evaluation terminology



Pursuant to SB 1077, the TAC may make recommendations regarding the criteria to be used to evaluate the pilot program and, based on the TAC recommendations, CalSTA shall implement a pilot program to identify and evaluate issues related to the potential implementation of a road charge program. Since an unbiased evaluation by an independent third party is crucial to assuring the integrity of the pilot process and resultant conclusions, the TAC recommends that, in addition to ensuring the TAC's recommended evaluation criteria is used, the evaluation should be carried out by an independent evaluator during and upon conclusion of the pilot project; evaluation results should be communicated to the TAC during the implementation process and upon conclusion of the pilot; and that the independent evaluation results be addressed and incorporated into the comprehensive California Road Charge Pilot Project Final Report issued by CalSTA and submitted to the TAC, the CTC and the Legislature.

5.2. Evaluation Criteria Recommendations

5.2.1. Goals Recommended by the TAC

The table below summarizes language from SB 1077 and goals derived from that statute:

Table 2: SB 1077 Goals for Road Charge

TAC considerations per SB 1077 Section 3090(f)	Derived goal
1. Availability, adaptability, reliability, security of methods that might be used in recording and reporting highway use	Provide methods that are available, adaptable, reliable and secure
2. The necessity of protecting all personally identifiable information used in reporting highway use	Protect personally identifiable information
3. The ease and cost of recording and reporting highway use	Provide users with low-cost compliance options
4. The ease and cost of administering the collection of taxes and fees as an alternative to the current system of taxing highway use through motor vehicle fuel taxes	Administer road charges efficiently Be easy to administer
5. Effective methods of maintaining compliance	Maintain compliance
6. The ease of reidentifying location data, even when personally identifiable information has been removed the data	Ensure identity protection using location data even after removal of personally identifiable information
7. Increased privacy concerns when location data is used in conjunction with other technologies	Ensure privacy protection when using location data with other technologies
8. Public and private agency access, including law enforcement, to data collected and stored for purposes of the RUC to ensure individual privacy rights are protected pursuant to Section 1 of Article I of the California Constitution	Protect privacy pursuant to Article I Section 1 of the California Constitution with respect to data access by public agencies (including law enforcement) and private firms

5.2.2. Evaluation Criteria Recommended by the TAC

For the Road Charge pilot program, SB 1077 empowered the TAC to recommend evaluation criteria. The TAC consulted several sources for prospective evaluation criteria, including the following:

- SB 1077. The legislation suggests a number of considerations. While none is dictated (rather, the TAC has latitude to recommend criteria), many of the considerations have proven useful as criteria.
- California Transportation Infrastructure Priorities. The Road Charging "principles" laid out in the California Transportation Infrastructure Priorities white paper represent goals that inspire criteria (http://www.calsta.ca.gov/res/docs/pdfs/2015/Agency/CTIP_RUCWhitepaper01122015.pdf).
- Similar programs in California. These include Caltrans ongoing agency performance measurement, High Speed Rail and tolling initiatives.

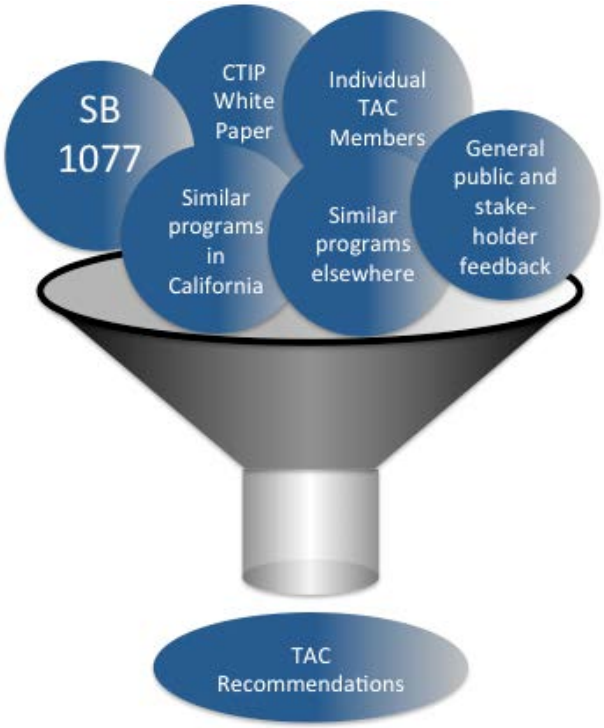
- Similar programs elsewhere, including New Zealand's ongoing programmatic evaluation of road charging and Oregon's road charging pilot test evaluation.

The table below summarizes "principles" from the California Transportation Infrastructure Priorities white paper on road charging, which the TAC adopted as goals for purpose of pilot evaluation:

Table 3: California Transportation Infrastructure Priorities Goals for Road Charge

CTIP Goals	Description
1. Fully Engage the Public	A road usage charge demonstration program needs to be transparent and engage the traveling public.
2. Honor Personal Privacy	The right to privacy must be honored. The system should protect specific driver and other personally identifiable information.
3. Be Fair and Equitable	All Californians should pay their fair share for using the transportation system – just like they pay their fair share of use for water or electricity. A fair system may account for vehicle type and size (e.g., fuel efficiency and weight) and consider incentives for lower income and disadvantaged Californians.
4. Keep Pace with Change	The system should be open, adaptable, and expandable towards current and future technologies, and allow private sector participation.
5. Avoid Double Charging	The individual paying a road usage charge should not have to pay both the gas tax and the road usage charge.
6. Be Simple	The system should be uncomplicated, streamlined, and transparent.
7. Clearly Identify Responsibilities	Roles, responsibilities, administration, and oversight functions should be clearly identified.
8. Be Enforceable	The system should meet all security and compliance measures to detect and deter evasion and fraud.
9. Integrate with Other Charges	As a full or partial replacement to the gas tax, the charge should also be compatible with current and future transportation revenue streams in California, and with other state, national and international transportation systems.
10. Reinvest in Transportation	The use of road usage charge revenue must be used for transportation purposes.
11. Allow User Choice	Californians should have the ability to select a reporting option of choice based on multiple technology and non-technology options.
12. Incorporate Cost Efficiencies	The system should incorporate low capital and operating costs to ensure highest return on system investment.
13. Integrate with Other State Policies	The system should also align with California's economic, energy, environmental, and congestion management goals.

The TAC recommends the following 8 categories of criteria that encompass 36 goals and 50 associated evaluation criteria (which are summarized in Appendix 7):



1. **Revenue**. Criteria related to the ability of road charging to serve as a suitable replacement revenue source for fuel taxes.
2. **Cost**. Criteria related to the costs associated with administering and collecting road charges, both from a user perspective and from an agency perspective.
3. **Operations**. Criteria related to how well road charge collections operate, both from customer and agency perspectives.
4. **User Experience**. Criteria related to how users interface with the road charging system.
5. **Privacy**. Criteria related to privacy protection measures built into the Road Charge pilot program.
6. **Data Security**. Criteria related to security of participant data collected, transmitted, stored, and used in the Road Charge pilot program.
7. **Equity**. Criteria related to the equity, perceived and real, along several dimensions.
8. **Communications**. Criteria related to communications with the Road Charge pilot project participants and the public.

The TAC recommends that criteria be developed in order to assess the performance of road charging, whether for future pilots, partial systems or fully operational systems. Below are several principles developed for and used by the TAC, intended to guide the creation and judgment of prospective evaluation criteria in the future:

- Reflect policy objectives.
- Be measureable (qualitatively or quantitatively) within the scope of the effort being evaluated.
- Provide useful feedback to policy decision makers.
- Provide useful feedback to road charging implementers and administrators (agencies), including potential private sector partners.
- Be useful beyond the phase being evaluated.
- Build on criteria used in other, related initiatives, including innovative transportation policy efforts.
- To the greatest extent possible, avoid conflict or large overlaps, which could cause confusion.

6. Enforcement and Compliance

The TAC recommends demonstrating the following enforcement and compliance activities:

1. **Checking for Anomalies**: The Account Management Oversight entity should be ultimately responsible for checking for anomalies in mileage data.
2. **Testing Enforcement**: Do not test enforcement mechanisms in the pilot, but continue to check for anomalies in mileage data.
3. **Administering Time Permits**: Use only electronic registration, with renewal reminders by email or text; and provide a 7-day grace period for renewals.
4. **Administering Mileage Permits and Odometer Charges**: Mileage Permit readings should be taken three times in the pilot, and four times for Odometer charges; each method should receive reminder notices 1-2 weeks prior to a reading due date; and each method should be entitled to a mileage "grace" of 300-miles. Neither of these methods should be provided for out-of-state vehicles.
5. **Detecting Odometer Fraud**: Odometer rollback should not be tested in the pilot.
6. **Detecting Violations in Automated Distance Reporting**: Review electronic logs to detect possible anomalies.
7. **Anomaly Investigation**: Account managers should be assigned the duty to resolve minor issues and report to Account Management Oversight entity.
8. **Issuance of Infraction Notices:** No infraction notices should be issued during the pilot.

6.1.1. Enforcement Definition

Enforcement is the act of compelling observance of or compliance with a law, rule or obligation. Effectively, enforcement means any action to make noncompliance with a law or regulation undesirable. Such actions typically include detecting violations, sending infraction notices to those determined to have violated the law or regulation, assessing penalties for those infractions, and conducting follow-up activities associated with the violation notices.

Enforcement activities are associated with but distinct from compliance activities. Compliance activities are intended to prevent violations from occurring, and consist of actions such as publishing the rule or law in an obvious place and conducting audits as a deterrent to noncompliance. In contrast, enforcement activities take place once a violation has occurred.

Enforcement activities are not necessarily carried out by law enforcement officers.

6.1.2. Testing Enforcement in the Pilot

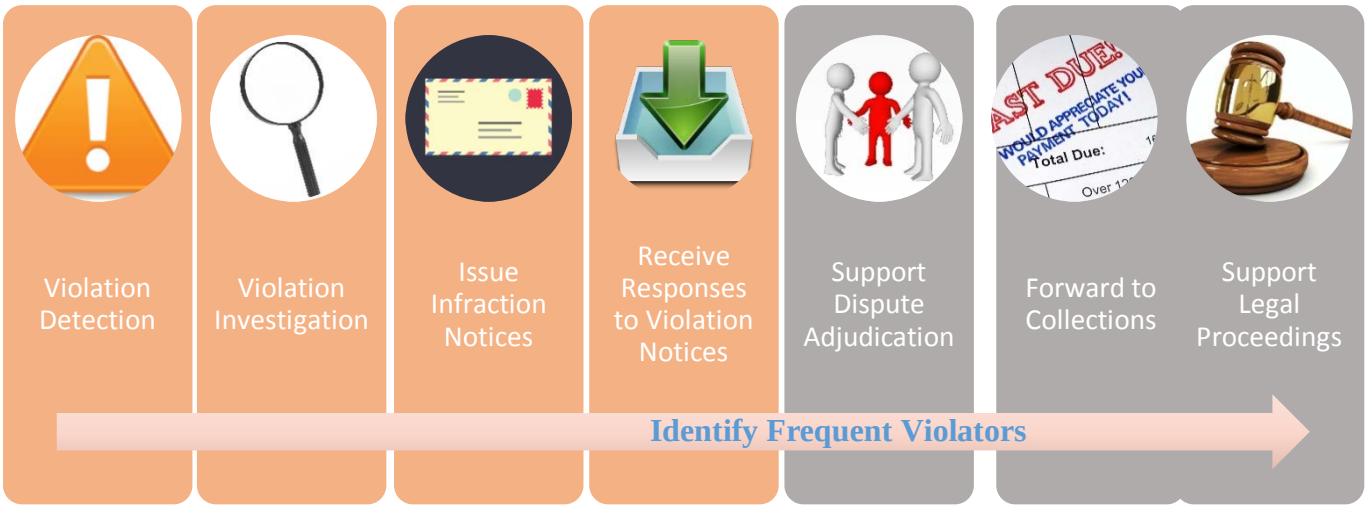
The pilot is unlikely to include individuals who intentionally try to evade the system. Volunteer-based programs generally do not attract those who are inclined to evade, and there is no financial incentive to evade. While it was suggested assigning some volunteers to the role of "violator" so that the road charging enforcement functionality can be tested, the TAC determined that this was not an effective method of testing enforcement in the pilot.

For the pilot, the TAC determined that a possible approach is to have the Account Management Oversight entity primarily conduct the enforcement activities.

6.1.3. The Enforcement Process

Each of the following stages in the enforcement process is explained on the next page.

Figure 2: Stage in Enforcement Process



6.1.4. Stages in the Enforcement Process

- Violation Detection: Activities such as data mining and/or analysis undertaken to detect suspicious activity that may indicate a violation has occurred
- Violation Investigation: Any activities undertaken to determine whether a suspicious activity was indeed a violation—a follow-up to Violation Detection or other indication of suspicious activity
- Issue Infraction Notices: Sending infraction notices to motorists if investigation confirms a violation
- Receive Responses to Violation Notices: Processing the responses received from violation notices, including receipt of payment (admission of being at fault) or notice of dispute
- Support Dispute Adjudication: Providing supporting documentation to an independent government body tasked with reviewing and resolving disputes
- Forward to Collections: When infraction notices receive no response or the motorist disappears from the proceedings at a later stage, the violation is forwarded to collections
- Support Legal Proceedings: Support court activities that may follow when a motorist does not comply with the decision of the adjudication body (e.g., the adjudication body upholds a violation)
- Identify Frequent Violators: In cases where penalties increase for repeat violations, retain violation data in account records for a prescribed period

6.1.5. Violation Detection Procedures

Violation detection procedures vary by operational concept. The following are the groups of violation detection activities by operational concept. The details of violation detection procedures can be found in Appendix 10:

- Time permit
- Mileage permit and odometer charges
- Automated mileage recording and reporting

Regardless of the roles ultimately assigned to the account manager and Account Management Oversight regarding enforcement, a clear set of standards that assign the proper level of evidence necessary to constitute a violation should be developed. In an operational road charging system, audit trails of odometer readings can also be used to check for fraud.

The TAC determined that simulation of violations by selecting participants to intentionally commit violations was not a rigorous test of evasion. TAC members determined that:

- Asking some participants to act as violators is contrived
- A pilot may not be the most appropriate venue for testing enforcement against real fraud and evasion attempts
- Saying that the pilot tested enforcement would not be accurate

However, the TAC concluded that checking for data anomalies is still very important. Thus the TAC recommends no simulation of evasion, but instead thorough investigation of anomalies. The TAC reasoned that since anomalies will occur, any potential future system should be ready to detect, prevent and address them.

7. Other Policy Issues and Recommendations

This section of the report reviews policy issues that arose during the TAC's deliberations that, while not specifically called out in SB 1077, were of interest and concern to the TAC. In the TAC's judgment, these issues merit additional research and evaluation, particularly once data collected during the pilot project becomes available.

7.1. Income Equity Implications of a Road Charge

Based on a scan of other road usage charge work conducted throughout the nation, no other states appear to be analyzing the question of how a road charge might be implemented in a manner that takes into consideration potential impacts on lower-income households.

While financial analysis suggests that a per-mile road charge could be more equitable across income levels than the current gas tax, to assess the merits of this, at least two assumptions must be tested: first, that lower-income households drive older, less fuel-efficient vehicles than other households, resulting in higher per-mile gas tax payments; and second, that the most important measure of tax affordability is the total amount of taxes that would be paid under a road charge system versus the gas tax system. Important data should be collected through the California Road Charge pilot on the types of vehicles owned and driven by volunteer participants of varying income levels. Therefore, the TAC recommends the recruitment of a sufficient number of lower-income households to participate in the pilot so that California-specific data can be gathered about vehicle ownership type and number of miles driven by this segment of the population. Once the pilot is complete and the data become available, the hypothesis that a road charge would be more equitable across income levels can be examined in detail.

The second assumption, however, does not require additional data about vehicle types and mileage but rather a better understanding of how lower-income populations perceive affordability of the road charge versus the gas tax. While the tax amount owed per mile driven is an important measure, the timing and method of paying the tax – and potential consequences of failure to pay the tax – may also be significant factors in determining the acceptability of a road charge system as applied to lower income households. All of the operational concepts studied and ultimately recommended by the TAC require payment of the road charge either in lump-sum (annually or quarterly), or by purchasing a fixed block of miles (e.g., in minimum denominations of 1,000 miles) or time (e.g. year, half-year, quarter, or month). Some of the TAC members observed that the ability to pay for roadways incrementally, as is the case with the gas tax, may be viewed as more desirable than a road charge system that requires an upfront, lump sum payment of the tax, even if the total taxes paid are the same (or less for persons driving lower-than-average mpg vehicles). Gaining insight into this question of affordability will be another key outcome from the pilot project, through periodic surveys and focus groups of volunteers that participate in the test.

Initial focus group responses indicate that the time permit may be an option that many drivers, including low-income drivers, view as attractive, both for ease of use and because of its protection of privacy. However, the pricing of a time permit poses challenges in that a price set too low could result in many drivers not paying for the miles they drive while setting the price based on the miles driven by high-mileage drivers may preclude low-income drivers from utilizing an option that offers excellent privacy protection or could require low-income drivers to pay for more miles than they

actually drive. The TAC has not resolved this conundrum, but believes that the pilot should collect the information necessary to answer questions that will enable it to be resolved in the future. These questions include: (1) Do low-income drivers express a preference for the time permit, and if so why? (2) Should the time permit be available to all drivers regardless of income or of annual miles driven? (3) At what rate, number of miles, might the time permit be set to minimize potential abuse yet still be accessible to low-income drivers?

Another viewpoint shared by some TAC members is that even if the road charge is more equitable than the gas tax, perhaps the road charge ought to be structured to be more progressive such that other taxes, fees and charges vary based on income levels. Although SB 1077 was silent on the issue of rate setting for the pilot, the TAC did consider how a road charge might be structured in a way that takes into account different income levels. After first acknowledging that tax policy is the domain of the Legislature and Governor, the TAC had some initial discussions about how differential rates could be charged to motorists based on income level. From an operational feasibility perspective, applying a rate factor based on the driver (rather than the characteristics of the vehicle or the trip characteristics) presents several operational challenges, including personal income reporting requirements, shielding personal income data from public records requests, ensuring that miles driven in a particular vehicle were conducted by the low-income qualifier and the appropriate rate reduction applied, etc. The TAC concluded that if low-income drivers were to receive a subsidy for their road use, one alternative method of effectuating that policy would be to provide means-tested vouchers to those who qualify for a low-income road charge discount rather than attempting to alter the road charge rate.

7.2. Potential Differential Impacts on Urban vs. Rural Residents

The topic of potential differential impacts of a road charge on urban and rural participants received significant public comment and TAC attention, and the diversity of interests represented by and to the TAC were clear in its discussion of this topic.

One TAC member suggested exploring how data generated from a road charge program might affect the distribution of road funding between urban and rural areas.

Public comment received noted that there are still extensive rural areas without either broadband or cellular coverage, and that the range of mileage measurement and reporting methods available during the pilot should take that into account.

Another comment submitted asked “How will this [pilot program] affect people in rural communities that travel an hour or more on county roads to get to work? Will the revenues be distributed equally based on actual road miles within a County or will it be based on population?”

Yet another comment received suggested that “[T]his proposed road charge program will have greater impacts on rural residents who have to travel further to reach employment or other resources”.

To date, there has not been research specific to California to determine whether a road charge would cause significantly different financial impacts to urban and rural residents. Research in other states suggests that rural residents actually fare slightly better under a road charge in

relation to urban residents than they do under the gas tax, in that their total tax is somewhat less under the road charge than under the gas tax. This occurs in part because while rural residents drive more miles per capita they also tend to drive less fuel efficient vehicles. Whether this translates to California remains to be determined.

The TAC recommended that this issue be carefully monitored during the pilot and that special consideration be given to assessing the impacts of the road charge on rural drivers (e.g., farm workers, ranchers) compared with their urban counterparts. The recommended composition of the volunteer pool reflects this concern and oversamples rural participants to ensure sufficient data is available to fully assess the impacts of the road charge on rural drivers.

7.3. Simulation Payment Options for the Pilot

While no revenue will be collected during the pilot, the TAC recommends simulating the road charge payment process. A simulated payment process should provide participants with special credit card numbers, checks or script (no actual cash value) with instructions to use them to pay their road charge invoice. In turn, the road charge account managers will receive payments and record the transactions to the participants' road charge accounts in a manner that most closely resembles how a future road charge invoicing and payment process would work.

In a fully implemented road charge system, the TAC expects payment options to include at a minimum:

- Online payments;
- Payment via US mail;
- Payment at retail locations;
- Payment by telephone.

The TAC recognizes that the pilot is a limited-duration, budget-constrained test and as such, establishing retail locations and telephone call centers established solely for the purpose of simulating payment transactions is not feasible. Therefore, the TAC recommends that simulated payment options be limited to online and US mail interactions.

7.4. Rate Setting for the Pilot

The issue of rate setting for the road charge pilot program was a topic of great interest to the TAC. While SB 1077 is silent on the TAC's role in the setting of a rate for the pilot, based on discussions with legislative staff, the TAC determined SB 1077 does not provide provisions to allow for the collection of revenue. As a result, the TAC recommends that, in order to adequately assess the ability to invoice based on a per-mile rate or rates, a revenue-neutral rate or rates should be developed and simulated for the pilot program.

8. Public Input and Involvement

This section summarizes the TAC's public engagement and gathering of input on the development of the pilot program. While the pilot program is an exercise in public participation requiring five thousand volunteers to actively participate in the testing, a major goal of the TAC has been to develop an extensive public involvement effort to gather feedback and gain a baseline understanding regarding the road charge policy's impacts on California drivers, including those based on differences of location (urban, suburban or rural drivers), age, ethnicity, gender and socio-economic status. This effort has provided key information and feedback on the Committee's policy and design recommendations.

The TAC provided guidance and direction for the approach to inviting and receiving public input into deliberations. From the outset, a number of crucial public engagement activities were identified and implemented as part of the TAC process. These activities included the following:

- As part of deliberations, the TAC hosted twelve open public meetings at 10 different locations throughout California;
- Establishment of a road charge work group to provide feedback on the TAC's work;
- Development of California Road Charge Pilot Program website including interest list and volunteer pages;
- Creation of a dedicated section for the Road Charge Technical Advisory Committee on the CTC website, providing a comment section;
- Results from five focus groups;
- Results from statewide survey;
- Presentations to stakeholder groups and a variety of conferences; and
- One-on-One meetings with state and local agencies, elected officials, members of the public, stakeholders and others.

8.1. TAC Monthly Meetings

The TAC was established in late 2014. As part of public input and involvement, the TAC convened monthly meetings beginning January 2015 consisting of twelve open public meetings held at 10 different locations throughout California. Each meeting provided opportunities for public input and direct involvement. Written public comments were compiled and published on the CTC website along with meeting agenda and materials. All meetings were webcasted and archived for those unable to attend in person.

During each TAC meeting, time was allotted for public comment for persons attending the meeting who wished to address the Committee on agenda or non-agenda items. Appendix 11 provides a summary of written and public comments received.

8.2. Establishment of Road Charge Workgroup

The TAC established a 22 member stakeholder Workgroup to facilitate stakeholder input, to meet specific consultation requirements outlined in SB 1077, and to support the TAC as a resource to efficiently gather and provide expert input on the design and evaluation of a road charge pilot program. The workgroup is chaired by Anne Mayer, Executive Director of the Riverside County Transportation Commission. Workgroup participants include representatives from a wide variety

of areas including: vehicle users; vehicle manufacturers; fuel distributors; tribal governments; social equity and sustainability advocates; taxpayers; state, local and regional transportation agencies; building and construction, and business and economy interests (See Appendix 3 for complete roster).

8.3. California Road Charge Pilot Program Website

As part of the outreach effort and to establish a two-way dialogue with the general public, Caltrans developed and launched a website for the pilot. The domain names purchased for this website included californiaroadchargepilot.com, californiaroadchargepilot.org, californiaroadchargepilot.net, and californiaroadchargepilot.info. This website provides a dedicated platform for disseminating information to all stakeholders and the general public including a range of options to obtain information, provide comments and volunteer for the pilot program.

8.4. CTC Website

The CTC dedicated a section of its website to the TAC. From the start of the TAC meetings in January 2015, the TAC has utilized CTC's website to inform stakeholders and the general public about the TAC's membership and activities. This webpage features a number of sections:

- Summary of the Road Charge Technical Advisory Committee;
- Direct link to the California Road Charge pilot program website;
- Committee information concerning meeting schedule and access to corresponding agendas, materials, minutes, comments received, and webcasts;
- List of Committee members and biographies;
- Reference information with links to key resources, articles and reports; and
- A Public Comment opportunity.

8.5. Inputs from Five Focus Groups

At its May meeting, the TAC recommended undertaking a series of five focus groups in five distinct communities to obtain information on the public's understanding of funding California's transportation infrastructure. The carefully designed focus groups used a variety of qualitative techniques with which to:

- Probe participants' motivations and underlying values associated with transportation priorities and improvements;
- Gauge their understanding of current barriers to funding;
- Elicit opinions about funding alternatives, including road charging; and
- Provide input into the development of the final set of telephone survey questions.

The five focus groups were held at the following locations: Oakland, San Diego, Los Angeles, Fresno and Redding. Discussions were two hours in length and included participant background questionnaires and dynamic discussions led by a professional moderator.

These five focus groups – comprising a total of 50 participants[18] – were conducted in June and July 2015 as the first step in establishing a baseline understanding of Californians' attitudes toward and perceptions of a proposal for a road charge, including methods to fund transportation improvements connected to the values of the general public. A second objective of the focus groups was to identify communication needs and sensitivities for effective public and stakeholder outreach to inform the TAC recommendations.

The format and guide used for each focus group was very similar, and the same moderator led all five focus groups.

The preliminary report, issued in August 2015, identified the key themes and issues that arose from the focus groups and made recommendations for modifications to questions for the telephone survey conducted during September 2015. Based on those themes and issues, key recommendations for modifications to the telephone survey were as follows:

- Do not make assumptions about respondents' level of understanding of transportation funding (generally) or road charging (specifically).
- Provide a brief, clear overview of road charging.
- Consider drawing parallels between services people generally already understand (such as water and electricity bills, pay-as-you-drive insurance) and road charge payment options.
- Revise question constructs to elicit ranked responses that help the TAC achieve better differentiation of priorities.

The preliminary report concluded that focus group participants found the concept of a road charge to be fair and reasonable once they understood it. But developing that understanding involved overcoming several obstacles, and it took time and various approaches.

In the fall of 2015, the final Public Engagement report included a more detailed analysis of the written exercises and focus group participants, along with results of the telephone survey. Key themes that emerged from the focus groups included the following:

- There is a widespread lack of knowledge about transportation funding.
- Nearly all participants had negative initial reactions to road charges.
  - People tended to make inaccurate and often negative assumptions about the program before they knew how it would work.
- The theme of "Fairness" resonated with participants.
  - The idea of fairness was far and away the top consideration in talking about the various taxation options, and discussion of fairness mitigated the negative reception of road charges.
  - Fairness was also an important factor in questions about how the road charge program would work.
- Choice is important.

[18] One Focus Group has nine participants (San Diego); three had 10 (Oakland, Los Angeles, Redding); and one had 11 (Fresno).

- The ability to choose different methods of implementation according to personal situations and preferences was important, especially for those who did not want their location to be tracked.

Key findings from the written exercises included the following:

- The condition of roads is not a top concern.
- The most frequently cited widespread transportation concerns are congestion (travel time), air quality, and better public transit options. Road condition, maintenance, and cost were much more localized concerns.
- There was a shared belief that Mileage-based fee would disincentivize fuel-efficiency and negatively impact the environment.

Vehicle registration fees and sales tax were initially the most preferred transportation funding option, whereas fees on miles driven were less preferred.

Many participants understood road charging to be another kind of toll.

- Participants were nearly split on whether a road charge is a Very Good/Good or Very Poor/Poor idea
- The various operational concepts presented varied less than 6% in the number of people who identified them as their top preference.
- Participants preferred government implementation of a road charging system.
- Program characteristics communicating fairness and choice were the most preferred.
- Learning about road charging and understanding how it is a fair option leads to acceptance, but privacy is still a big concern.

8.6. Inputs from Statewide Survey

At its May meeting, in addition to the focus groups, the TAC recommended undertaking telephone surveys of a statistically significant sample of California residents to explore their understanding of road funding in California.

A total of 900 California residents age 18 and over were interviewed and surveys were completed comprising a total of 26 questions, including 600 registered voters and 300 residents not registered to vote. Interviewers conducted surveys in multiple languages, including Spanish. The final sample size of 900 Californians is sufficient to assess public opinions and to review findings by multiple subgroups, including age, gender, ethnicity or race, and geographic area of the state.

In tandem with the focus groups, the telephone survey was the second step in establishing a baseline understanding of Californians' attitudes towards and perceptions of road charging as a general concept. A second objective was to gain a better understanding of how Californians value transportation as compared to other important issues such as the economy and jobs, quality of local and state roads, the environment, drought relief, etc.

The telephone survey had the following features:

- The survey questionnaire was completed in 10 minutes or less.

- The sample consisted of a minimum of 900 completed surveys with approximately 600 of the 900 completed survey subject/participants being registered voters.
- The survey team was staffed to complete interviews in Spanish and other languages.
- Interviewers were trained for multi-lingual households.
- Telephone numbers included in this sample were randomly generated, and survey respondents were reached by both cell phone and landline phone.
- The margin of error for the total sample was ± 3.3 percentage points.
- The survey panel was weighted by gender, age, ethnicity, and other demographics to reflect the population and as agreed to with the TAC, and included ethnicity stratification to reflect population of each area.

The results of the telephone survey and focus groups provided an opportunity to:

- Determine to what extent people understand California's transportation funding shortfalls;
- Assess baseline values, priorities and awareness of transportation issues across California's varied communities; and
- Determine perceptions and attitudes of the general public toward road charging.

The report on the telephone survey describes the data collected, analysis performed and conclusions reached during the baseline activity regarding Californians' perceptions of road charging in California. This baseline has been important in order to measure shifts in attitudes and insights into Californians' perceptions about road charging over the course of the program timeline.

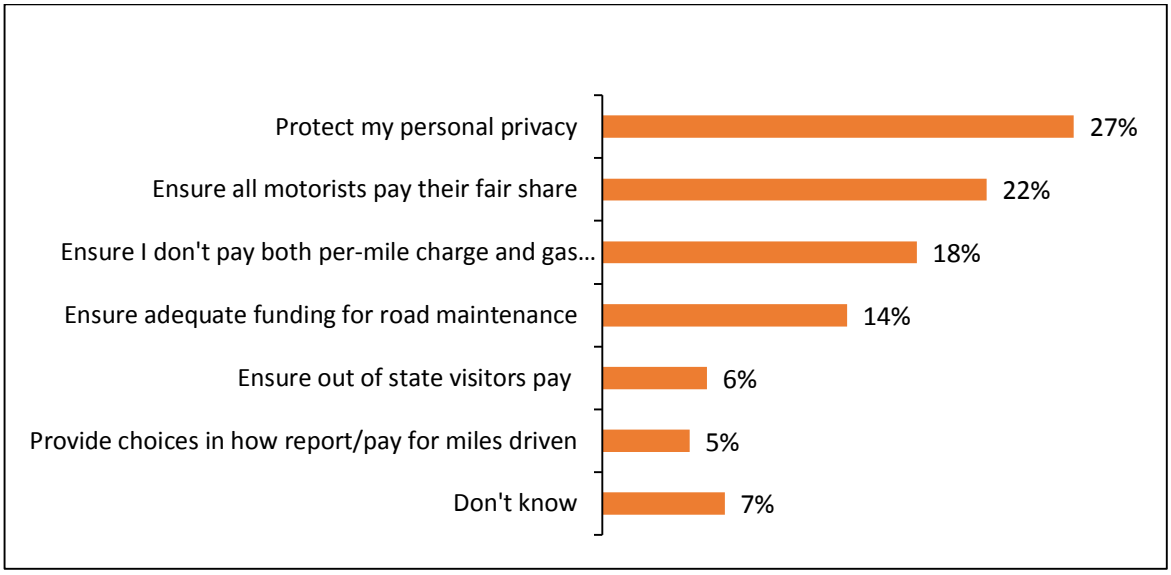
Key findings of the telephone surveys included the following:

- Transportation priorities:
  - Consistent with the focus groups, drought relief and water supply issues were top of mind for Californians, scoring 8.2 on a scale of 0-10, where 10 is highest concern. The quality of local and state roads was much less pressing to people: just over a third (37%) rated the issue an 8 or higher, with a mean score of 6.4.
  - Given three transportation priorities—maintaining existing roads, building new and/or wider roads, and promoting alternatives to driving—nearly 80% of Californians split between maintaining existing roads and promoting alternatives.
  - Nearly three quarters of Californians felt the quality of neighborhood streets and roads and state highways was excellent or good. Just over 20% rated the quality poor, and 4%-5% very poor.
  - A majority of respondents (54%) felt that the current base excise tax of 18 cents per gallon was about right to fund state road repairs, while 23% thought it was too much, and 18% felt it was too little.
- Perceptions of road charging:
  - There was very little familiarity with road charging.
  - After being provided with basic information about a road charge, nearly half the sample (46%) said a road charge would be less fair, counterbalanced by 48% who thought it would be about the same (29%) or more fair (19%).

- Road charge implementation preferences:
  - After being provided with very basic information about reporting options, one third (33%) of Californians preferred the option to buy a permit to drive unlimited miles for up to one year. Nearly as many (29%) opted to report miles automatically using technology, and 20% preferred annual self-reporting. A hefty 17% did not know which reporting method they preferred.
  - In contrast with the focus groups, about half (51%) of respondents said that having a choice in reporting methods would make no difference in their level of support for road charging, while 18% said it would make them more supportive and 25% said it would make them less supportive. In the face of a considerable amount of unfamiliar information, and without a fuller descriptive context or better understanding of what road charges are and how they might work, offering choices may have only confused many respondents.
- Vehicle ownership and driving habits:
  - Six in ten respondents (61%) said they were likely to consider an electric or hybrid vehicle for their next vehicle purchase or lease.
  - Two-thirds of the sample (67%) said their households currently own or lease at least two vehicles, a quarter (25%) own or lease one vehicle, and 6% said they do not own a vehicle. 13% of households had at least one hybrid or electric car.

The most important issues identified by the telephone survey respondents differ somewhat from the most important issues identified by focus group participants. The reason for the differences is primarily the format for the two research activities. Focus groups had an opportunity to explore road charging in depth, analyze information along with their fellow participants, and identify issues that most resonated after some thought and discussion. Survey respondents, by contrast, were asked for quick judgments to a direct question in a brief telephone call.

The figure below summarizes the “most important” issue identified by survey respondents from a list of six choices.



9. Conclusions and Next Steps

The TAC has concluded the exploration of a road charge as an alternative to the gas tax has merit by designing a pilot program that meets and exceeds the requirements of SB 1077. Moving forward the TAC anticipates continued involvement in the pilot program, assisting in the recruitment of volunteers, representing the TAC at meetings, and providing advice to CalSTA, CTC and the Legislature as needed.

With the submittal of this report to CalSTA the work of the TAC will move into a monitor and advisory role. Over the 18 months the TAC will meet periodically to be updated on the status of the development and deployment of the pilot program and to provide advice to CalSTA on any issues arising during this time period related the recommendations contained in this report.

Upon completion of the pilot program and the submission the pilot program report by CalSTA to the TAC, CTC and the Legislature, the TAC will reconvene to review the findings report and to prepare a report and recommendations for future road charge efforts for CTC consideration.

Appendix 1: Senate Bill 1077

Senate Bill No. 1077

CHAPTER 835

An act to add and repeal Chapter 7 (commencing with Section 3090) of Division 2 of, and to repeal Chapter 7 (commencing with former Section 3100) of Division 2 of, the Vehicle Code, relating to vehicles.

[Approved by Governor September 29, 2014. Filed with Secretary of State September 29, 2014.]

LEGISLATIVE COUNSEL'S DIGEST

SB 1077, DeSaulnier. Vehicles: road usage charge pilot program.

Existing law establishes the Transportation Agency, which consists of the Department of the California Highway Patrol, the California Transportation Commission, the Department of Motor Vehicles, the Department of Transportation, the High-Speed Rail Authority, and the Board of Pilot Commissioners for the Bays of San Francisco, San Pablo, and Suisun.

This bill would require the Chair of the California Transportation Commission to create a Road Usage Charge (RUC) Technical Advisory Committee in consultation with the Secretary of the Transportation Agency. The bill would require the technical advisory committee to study RUC alternatives to the gas tax and to make recommendations to the Secretary of the Transportation Agency on the design of a pilot program, as specified. The bill would also authorize the technical advisory committee to make recommendations on the criteria to be used to evaluate the pilot program. The bill would require the technical advisory committee to consult with specified entities and to consider certain factors in carrying out its duties. The bill would require the Transportation Agency, based on the recommendations of the technical advisory committee, to implement a pilot program to identify and evaluate issues related to the potential implementation of an RUC program in California by January 1, 2017. The bill would require the agency to prepare and submit a report of its findings to the technical advisory committee, the commission, and the appropriate fiscal and policy committees of the Legislature by no later than June 30, 2018, as specified. The bill would also require the commission to include its recommendations regarding the pilot program in its annual report to the Legislature, as specified. The bill would repeal these provisions on January 1, 2019.

BILL TEXT

THE PEOPLE OF THE STATE OF CALIFORNIA DO ENACT AS FOLLOWS:

SECTION 1.

The Legislature finds and declares all of the following:

(a) An efficient transportation system is critical for California’s economy and quality of life.

(b) The revenues currently available for highways and local roads are inadequate to preserve and maintain existing infrastructure and to provide funds for improvements that would reduce congestion and improve service.
(c) The gas tax is an ineffective mechanism for meeting California's long-term revenue needs because it will steadily generate less revenue as cars become more fuel efficient and alternative sources of fuel are identified. By 2030, as much as half of the revenue that could have been collected will be lost to fuel efficiency. Additionally, bundling fees for roads and highways into the gas tax makes it difficult for users to understand the amount they are paying for roads and highways.
(d) Other states have begun to explore the potential for a road usage charge to replace traditional gas taxes, including the State of Oregon, which established the first permanent road user charge program in the nation.
(e) Road usage charging is a policy whereby motorists pay for the use of the roadway network based on the distance they travel. Drivers pay the same rate per mile driven, regardless of what part of the roadway network they use.
(f) A road usage charge program has the potential to distribute the gas tax burden across all vehicles regardless of fuel source and to minimize the impact of the current regressive gas tax structure.
(g) Experience to date in other states across the nation demonstrates that mileage-based charges can be implemented in a way that ensures data security and maximum privacy protection for drivers.
(h) It is therefore important that the state begin to explore alternative revenue sources that may be implemented in lieu of the antiquated gas tax structure now in place.
(i) Any exploration of alternative revenue sources shall take privacy implications into account, especially with regard to location data. Travel locations or patterns shall not be reported, and legal and technical safeguards shall protect personal information.

SEC. 2.

Chapter 7 (commencing with Section 3090) is added to Division 2 of the Vehicle Code, to read:

CHAPTER 7. Road Usage Charge Pilot Program

3090. (a) The Chair of the California Transportation Commission shall create, in consultation with the Secretary of the Transportation Agency, a Road Usage Charge (RUC) Technical Advisory Committee.
(b) The purpose of the technical advisory committee is to guide the development and evaluation of a pilot program to assess the potential for mileage-based revenue collection for California's roads and highways as an alternative to the gas tax system.
(c) The technical advisory committee shall consist of 15 members. In selecting the members of the technical advisory committee, the chair shall consider individuals who are representative of the telecommunications industry, highway user groups, the data security and privacy industry, privacy rights advocacy organizations, regional transportation agencies, national research and policymaking bodies, including, but not limited to, the Transportation Research Board and the American Association of State Highway and Transportation Officials, Members of the Legislature, and other relevant stakeholders as determined by the chair.
(d) Pursuant to Section 14512 of the Government Code, the technical advisory committee may request the Department of Transportation to perform such work as the technical advisory committee deems necessary to carry out its duties and responsibilities.
(e) The technical advisory committee shall study RUC alternatives to the gas tax. The technical advisory committee shall gather public comment on issues and concerns related to the pilot program and shall make recommendations to the Secretary of the Transportation Agency on the design of a pilot program to test alternative RUC approaches. The technical advisory committee may also make recommendations on the criteria to be used to evaluate the pilot program.

(f) In studying alternatives to the current gas tax system and developing recommendations on the design of a pilot program to test alternative RUC approaches pursuant to subdivision (e), the technical advisory committee shall take all of the following into consideration:
(1) The availability, adaptability, reliability, and security of methods that might be used in recording and reporting highway use.
(2) The necessity of protecting all personally identifiable information used in reporting highway use.
(3) The ease and cost of recording and reporting highway use.
(4) The ease and cost of administering the collection of taxes and fees as an alternative to the current system of taxing highway use through motor vehicle fuel taxes.
(5) Effective methods of maintaining compliance.
(6) The ease of reidentifying location data, even when personally identifiable information has been removed from the data.
(7) Increased privacy concerns when location data is used in conjunction with other technologies.
(8) Public and private agency access, including law enforcement, to data collected and stored for purposes of the RUC to ensure individual privacy rights are protected pursuant to Section 1 of Article I of the California Constitution.
(g) The technical advisory committee shall consult with highway users and transportation stakeholders, including representatives of vehicle users, vehicle manufacturers, and fuel distributors as part of its duties pursuant to subdivision (f).

3091. (a) Based on the recommendations of the RUC Technical Advisory Committee, the Transportation Agency shall implement a pilot program to identify and evaluate issues related to the potential implementation of an RUC program in California by January 1, 2017.
(b) At a minimum, the pilot program shall accomplish all of the following:
(1) Analyze alternative means of collecting road usage data, including at least one alternative that does not rely on electronic vehicle location data.
(2) Collect a minimum amount of personal information including location tracking information, necessary to implement the RUC program.
(3) Ensure that processes for collecting, managing, storing, transmitting, and destroying data are in place to protect the integrity of the data and safeguard the privacy of drivers.
(c) The agency shall not disclose, distribute, make available, sell, access, or otherwise provide for another purpose, personal information or data collected through the RUC program to any private entity or individual unless authorized by a court order, as part of a civil case, by a subpoena issued on behalf of a defendant in a criminal case, by a search warrant, or in aggregate form with all personal information removed for the purposes of academic research.

3092. (a) The Transportation Agency shall prepare and submit a report of its findings based on the results of the pilot program to the RUC Technical Advisory Committee, the California Transportation Commission, and the appropriate policy and fiscal committees of the Legislature by no later than June 30, 2018. The report shall include, but not be limited to, a discussion of all of the following issues:
(1) Cost.
(2) Privacy, including recommendations regarding public and private access, including law enforcement, to data collected and stored for purposes of the RUC to ensure individual privacy rights are protected pursuant to Section 1 of Article I of the California Constitution.
(3) Jurisdictional issues.
(4) Feasibility.
(5) Complexity.
(6) Acceptance.
(7) Use of revenues.
(8) Security and compliance, including a discussion of processes and security measures necessary to minimize fraud and tax evasion rates.

(9) Data collection technology, including a discussion of the advantages and disadvantages of various types of data collection equipment and the privacy implications and considerations of the equipment.
(10) Potential for additional driver services.
(11) Implementation issues.
(b) The California Transportation Commission shall include its recommendations regarding the pilot program in its annual report to the Legislature as specified in Sections 14535 and 14536 of the Government Code.

3093. This chapter shall remain in effect only until January 1, 2019, and as of that date is repealed, unless a later enacted statute, that is enacted before January 1, 2019, deletes or extends that date.

SEC. 3.
Chapter 7 (commencing with former Section 3100) of Division 2 of the Vehicle Code is repealed.

Appendix 2: Technical Advisory Committee Roster and Biographies

Road Charge Technical Advisory Committee Roster

Name	Organization	Title	Area of Representation
Jim Madaffer (Chair)	California Transportation Commission	Commissioner	California Transportation Commission
Lisa Bartlett	Orange County	Supervisor	Regional Transportation Agency
Jim Beall	California Senate	Senator	Legislature
David Chiu	California Assembly	Assemblymember	Legislature
David Finigan	Del Norte County	Supervisor	Regional Transportation Agency
Stephen Finnegan (Vice-Chair)	Automobile Club of Southern California	Manager of Government & Community Affairs	Highway User Groups
Gautam Hans	Center for Democracy and Technology	Director and Policy Counsel	Data Security and Privacy Industry
Loren Kaye	Foundation for Commerce and Education	President	Business and Economy
Richard Marcantonio	Public Advocates, Inc.	Managing Attorney	Social Equity
Pam O'Connor	City of Santa Monica	Councilmember	Regional Transportation Agency
Eshwar Pittampalli	Open Mobile Alliance	Director of Market Development	Telecommunications
Robert Poythress	City of Madera	Mayor	Regional Transportation Agency
Eric Sauer	California Trucking Association	Vice-President of Policy & Government Relations	Highway User Groups
Lee Tien	Electronic Frontier Foundation	Senior Attorney	Privacy Rights Advocacy
Martin Wachs	UCLA Luskin School of Public Affairs	Professor Emeritus of Urban Planning	National Research and Policymaking

California Road Charge
Technical Advisory Committee Member Biographies

1.) James Madaffer – Commissioner, California Transportation Commission (CTC)
California Transportation Commission Representative

Jim Madaffer is the owner of Madaffer Enterprises, Inc., a successful public policy and government relations consulting firm specializing in government and corporate relations statewide, representing clients from a variety of industries including medical devices, insurance, travel, legal, development, telecommunications, and more. In 2000, Jim was elected to the San Diego City Council and was reelected in 2004. During his tenure on the City Council from 2000-2008 (leaving due to term limits), Jim held a number of leadership positions including President Pro-Tem and Mayor Pro-Tem.

Jim's accomplishments as an elected official are numerous: building libraries, fostering economic development, water and waste water policy and specializing in regional transportation and planning issues. Jim is also Past President of the League of California Cities. He served on the League Board of Directors for over eight years. During his tenure with the League, Jim led the passage of several statewide ballot measures that protect cities, represented California Cities before federal officials in Washington DC on various issues and worked closely with the Governor and California's legislative leadership on budget, environmental, transportation and planning issues. Jim was appointed by Governor Brown to the California Transportation Commission in January 2014.

2.) Senator Jim Beall (D – San Jose) – California State Senate
Legislative Representative – Senate

Jim Beall was elected in November 2012 to the California State Senate to represent District 15. He brings a lifetime of experience and understanding in government efficiency, transportation, and human services to the State Senate. In three decades of public service – first as a San Jose City Councilman, then as a Santa Clara County Supervisor, and an Assemblymember - Jim Beall has left his mark across Silicon Valley. He spurred the construction of Highways 85 and 87; fought to bring BART to San Jose; and authored bills to ease financing for seismic upgrades for our hospitals and also to grow California's solar industry. This has meant thousands of good jobs for working families. He is known throughout California for his legislation to help foster care children, low-income families, and people with disabilities. And he has made a lasting difference in the lives of over 100,000 local youth by leading the drive to create the Children's Health Initiative to ensure that every child in Santa Clara County can be covered by health insurance.

3.) Assemblymember David Chiu (D – San Francisco) - California State Assembly
Legislative Representative - Assembly

David Chiu was elected to the California State Assembly in November 2014. He represents the 17th Assembly District, which encompasses eastern San Francisco. Before joining the State Assembly, David Chiu served as President of the San Francisco Board of Supervisors for six years. With a reputation as a consensus maker, Chiu was the first Board President in San Francisco history elected by fellow Supervisors to three consecutive terms, and the first Asian American to hold the post. Chiu was first elected Supervisor in 2008 to represent San

Francisco's northeast neighborhoods of District 3, which also includes the city's major tourism, retail, downtown and wharf areas; he was overwhelmingly re-elected in 2012.

The son of immigrant parents, David Chiu grew up in Boston and received his undergraduate, law and master's in public policy degrees from Harvard University. In the mid-1990s, Chiu served as Democratic Counsel to the U.S. Senate Constitution Subcommittee and Senator Paul Simon's aide to the U.S. Senate Budget Committee. After moving to San Francisco in 1996, David Chiu served as a criminal prosecutor at the San Francisco District Attorney's Office and as a civil rights attorney with the Lawyers' Committee for Civil Rights. Chiu was also a founder of the public affairs technology company Grassroots Enterprise, where he served as Chief Operating Officer. As Supervisor, David Chiu authored over 100 ordinances across a wide range of policy areas, including affordable housing, job creation, public safety, the environment, health care, transportation, civil rights, ethics and technology.

4.) David Finigan – Supervisor, Del Norte County
Regional Transportation Agency Representative

Supervisor Finigan has served on the Del Norte County Board of Supervisors since he was first elected in 1996, serving five times as Chairman. Now in his fifth term, Supervisor Finigan also sits on various local, state and regional boards. He is a Past President of the California State Association of Counties, and also serves on the board and as a past Chair of the Regional Council of Rural Counties. Additionally, he serves on the boards of the Western Interstate Region of the National Association of Counties, and on the National Association of Counties Transportation Steering Committee.

Aside from serving on Del Norte County's Local Transportation Commission, Supervisor Finigan is also presently Chair of the Border Coast Regional Airport Authority and Treasurer for the Tri Agency Economic Development Joint Powers Authority. Supervisor Finigan served on the economic development working group of the Governor's Broadband Task Force and is currently a member of Cal Fire's Demonstration Forest Advisory Council and the National Forest Counties and Schools Coalition board of directors. In addition, Supervisor Finigan was one of the founding and current commissioners of First 5 Del Norte / Children's and Family Commission. David is also the Broker/owner of Finigan Real Estate, having worked as a realtor for 27 years.

5.) Stephen Finnegan – Manager of Government & Community Affairs, Automobile Club of Southern California
Highway User Group Representative

Stephen Finnegan has over 25 years of experience in transportation, finance, business, and advocacy. His career includes work as a financial analyst with Bank of America, positions in planning and operations with the Los Angeles County Metropolitan Transportation Authority (Metro), serving as a management consultant to public agencies and non-profit organizations, and leading government affairs, community relations, traffic safety, advocacy, and public policy work for the Automobile Club of Southern California and affiliated AAA clubs providing service to 14 million members in 21 states.

At Metro, Mr. Finnegan was the planning director for the San Gabriel Valley, managed the County's $12 billion, seven-year Transportation Improvement Program, served as the Metro liaison to the California Transportation Commission, and managed the nation's largest public motorist aid system. As a consultant, Mr. Finnegan completed management, performance,

financial, transportation, and other studies for cities, counties, special districts, and non-profit organizations in California and the west.

Mr. Finnegan currently leads government affairs, community relations, and public policy work for the Automobile Club of Southern California where he advocates for motorist, insurance, and business issues, including improved mobility and traffic safety, effective and efficient use of transportation resources, adequate infrastructure for economic growth, and a healthy business environment. Mr. Finnegan received a Master of Arts degree in urban planning from the University of California at Los Angeles and a Bachelor of Arts from Claremont McKenna College.

6.) Lisa Bartlett – Supervisor, Orange County
Regional Transportation Agency Representative

Lisa Bartlett is currently serving as the Fifth District and also represents South Orange County on the Orange County Transportation Authority Board of Director and both Transportation Corridor Agencies Board of Directors.

Bartlett was elected to the Dana Point City Council in November 2006 and was re-elected in November 2010, serving as Mayor Pro Tem in 2007-08 and as Mayor in 2009 and 2014. Supervisor Bartlett born and raised in Southern California and has been a resident of South Orange County for the past 20+ years. She is a proud long time resident of Dana Point and has watched the city evolve into one of the most desirable destination resort communities along the coast, a place we call Paradise. Lisa earned a Bachelor's degree in Finance, a Master's degree in Business Administration, became a Certified PMP (Project Management Professional) and a licensed Real Estate Broker. Her professional career spans several decades and includes holding executive management positions in a worldwide computer software company, a project management consulting firm and several law firms.

During her eight years serving on the Dana Point City Council, she served on the Board of Directors for the Transportation Corridor Agency and the Ocean Institute, President for the Association of California Cities- Orange County, Past President for the California League of Cities, Orange County Division, Member of the Southern California Edison Government Advisory Panel and Executive Administration Member and Regional Council Member for the Southern California Association of Governments.

Her participation on regional boards and committees allows for collaborative regional-based representation as well as greater visibility for Orange County. Lisa believes in and strives for fiscal responsibility, accountability and greater transparency in government.

Supervisor Bartlett has always been actively involved in philanthropic work and several non-profit organizations such as Children's Hospital Queen of Hearts Guild, the Monarch Beach Sunrise Rotary, and the Ocean Institute.

7.) Gautam Hans – Director and Policy Counsel, Center for Democracy and Technology
Data Security and Privacy Representative

Gautam Hans is Director and Policy Counsel for the Center for Democracy and Technology (CDT), San Francisco, promoting CDT's presence on the West Coast as a leader in technology policy and advocacy. His work focuses on digital civil liberties policy, outreach, and development. Gautam joined CDT in 2012 as the Ron Plesser Fellow, focusing on

consumer privacy issues, including mobile technology, government regulation and enforcement, and the intersection of privacy and free speech. As the Plesser Fellow, he advocated CDT's consumer privacy agenda in multi-stakeholder convenings, regulatory filings, conferences, and the press. Prior to joining CDT, Gautam interned at the FTC's Bureau of Consumer Protection, the Electronic Privacy Information Center, the American Civil Liberties Union of Michigan, and the American Civil Liberties Union of Northern California.

In 2006, Gautam earned his B.A. in English and Comparative Literature from Columbia University. He then worked as an Editorial Assistant at the Knopf Group of Random House. While in law school, he served as Editor-in-Chief of the Michigan Telecommunications and Technology Law Review and worked as a student attorney in the Michigan Clinical Law Program and the Entrepreneurship Clinic. In 2012, Gautam earned his J.D., cum laude, from the University of Michigan Law School and his M.S. in Information from the University of Michigan School of Information.

8.) Loren Kaye – President, Foundation for Commerce and Education
Business and Economy Representative

Loren Kaye was appointed president of the Foundation for Commerce and Education in January 2006. Mr. Kaye has devoted his career to developing, analyzing and implementing public policy issues in California, with a special emphasis on improving the state's business and economic climate. Mr. Kaye is also a gubernatorial appointee to the state's Little Hoover Commission, charged with evaluating the efficiency and effectiveness of state agencies and programs. Mr. Kaye served in senior policy positions for Governors Pete Wilson and George Deukmejian, including Cabinet Secretary to the Governor and Undersecretary of the California Trade and Commerce Agency.

Mr. Kaye has also represented numerous private sector interests, managing issues that affect specific business sectors to promote an improved business climate or to resist further regulation or costs on business. Mr. Kaye lives in Sacramento with his wife and daughter. The California Foundation for Commerce and Education is affiliated with the California Chamber of Commerce and serves as a "think tank" for the California business community. The Foundation is dedicated to preserving and strengthening the California business climate and private enterprise through accurate, impartial and objective research and analysis of public policy issues of interest to the California business and public policy communities.

9.) Richard Marcantonio – Managing Attorney, Public Advocates, Inc.
Social Equity Representative

Richard A. Marcantonio leads Public Advocates' transportation, housing, and climate justice advocacy and litigation team. His deep knowledge of both affordable housing and transportation equity makes him a valued interdisciplinary advocate. As California reforms its approach to regional planning for land use and transportation, Richard is working with coalitions around the state to ensure that laws calling for greenhouse gas emission reductions are implemented to bring benefits, rather than added burdens, to low-income communities and communities of color. Before coming to Public Advocates, Richard served as director of litigation at Legal Aid of the North Bay for nine years, specializing in housing issues in Marin and Napa Counties.

Richard has also practiced civil and appellate litigation at the Howard, Rice law firm and clerked for the Hon. Robert L. Carter, U.S. District Judge for the Southern District of New York.

Richard received his A.B. from Princeton University in 1982. He graduated cum laude and Order of the Coif from New York University School of Law in 1987, where he was articles editor of the N.Y.U. Review of Law and Social Change, and represented low-income clients at N.Y.U.'s Urban Law Clinic and Unemployment Action Center.

10.) Pam O'Connor – Councilmember, City of Santa Monica
Regional Transportation Agency Representative

Throughout nearly two decades, Councilmember Pam O'Connor has championed policies and partnerships that enhance community livability and wellbeing. She is particularly interested in issues that advance mobility, transportation and sustainability. Mayor O'Connor serves on the Los Angeles County Metropolitan Transportation Authority (Metro) Board where she leads Metro's Sustainability Committee and chairs its Planning and Programming Committee. Pam O'Connor is also Chair of the Exposition Metro Line Construction Authority Board that oversees building of the light rail line that extends from Downtown Los Angeles to Santa Monica. In 2012 as President of the Southern California Association of Governments, the nation's largest metropolitan planning organization, she led the 84-member Regional Council in the unanimous adoption of the region's first Sustainable Communities Strategy. She holds Masters' degrees in Planning and in Technology Management from Eastern Michigan University and a B.S. in Communications from Southern Illinois University. Councilmember O'Connor views community wellbeing as the natural next step in the evolution of local government, as well as a way to advance the connection between mobility and sustainability issues by looking at their impact through the lens of human flourishing.

11.) Eshwar Pittampalli – Director of Market Development, Open Mobile Alliance
Telecommunications Industry Representative

Dr. Eshwar Pittampalli currently serves as the Director of Market Development for the Open Mobile Alliance (OMA) in San Diego, CA. Prior to joining OMA, Pittampalli was a partner in the Alcatel-Lucent Corporate Marketing organization promoting the Internet of Things (M2M) market growth program. Prior to this role, he led the Alcatel-Lucent corporate market intelligence team as Senior Director forecasting global telecom market trends, sizing, shares supporting CFO's office, product groups and regions. He has over twenty eight years of experience with AT&T Bell Labs, Lucent Technologies and Alcatel-Lucent.

In 2003, Dr. Pittampalli was awarded Bell Labs' highest honor, Bell Labs Fellow, for his outstanding technical contributions and leadership in advancing wireless communications technology and Standards. Dr. Pittampalli is a registered professional engineer with Master of Science and Ph.D. degrees in electrical engineering from the University of Oklahoma in Norman, Oklahoma. Dr. Pittampalli is also a Registered Patent Law practitioner with a Mini-MBA from the Wharton School of Business.

12.) Robert Poythress – Mayor, City of Madera
Regional Transportation Agency Representative

Mayor Robert Poythress is currently serving his third term in office. He was first elected to the City Council in 2004 and reelected in 2008 and 2012. In 2012, Robert was elected as the first elected Mayor in the City of Madera through 2016. Robert is a native Maderan. He graduated from Madera High School in 1974. After high school, he attended California Polytechnic State University, San Luis Obispo, California and in 1978 graduated with a Bachelor of Science (BS) Degree in Agricultural Business Management; and in 1998 he

earned his graduate degree from Pacific Coast Banking School, University of Washington. Robert has been in the banking industry since 1979. He is currently Vice President and Manager of Citizen's Business Bank in Madera, California where he has been since 2005. He is also a partner in Teco Hardware and Poythress Farms. Robert currently serves as a Commissioner on the Madera County Transportation Commission and as Chairman of the San Joaquin Valley Regional Policy Council.

13.) Eric Sauer – Vice-President of Policy & Government Relations, California Trucking Association
Highway User Group Representative

Eric Sauer is the Vice President of Policy and Government Relations for the California Trucking Association (CTA) and is responsible for overseeing the Association's advocacy, regulatory and policy agenda and priorities. Mr. Sauer has been with CTA since 2001 and was promoted to Vice President in 2006. Throughout his tenure at CTA, Mr. Sauer has worked extensively with the California Highway Patrol, Department of Motor Vehicles, Department of Transportation (Caltrans) and the Federal Motor Carrier Safety Administration on the development and implementation of major programs and regulations impacting the trucking industry. Additionally, Mr. Sauer has been the Chairperson for the California Transportation Permit Advisory Council since its inception. He is a graduate of California State University Sacramento and resides in Drytown (Amador County).

14.) Lee Tien – Senior Attorney, Electronic Frontier Foundation
Privacy Rights Advocacy Representative

Lee Tien is a Senior Staff Attorney with the Electronic Frontier Foundation, specializing in free speech law, privacy, and surveillance law. Before joining EFF, Lee was a sole practitioner specializing in Freedom of Information Act (FOIA) litigation. Mr. Tien has published articles on children's sexuality and information technology, anonymity, surveillance, and the First Amendment status of publishing computer software. Lee received his undergraduate degree in psychology from Stanford University, where he was very active in journalism at the *Stanford Daily*. After working as a news reporter at the *Tacoma News Tribune* for a year, Lee went to law school at Boalt Hall, University of California at Berkeley. Lee also did graduate work in the Program in Jurisprudence and Social Policy at UC-Berkeley.

15.) Martin Wachs – Professor Emeritus, UCLA Luskin School of Public Affairs
National Research and Policy Representative

Martin Wachs served as Professor Emeritus of Civil & Environmental Engineering and of City & Regional Planning at the University of California, Berkeley, where he directed the Institute of Transportation Studies. He earlier spent 25 years at UCLA, where he was Chairman of the Department of Urban Planning for eleven years. After retiring from the University, Wachs became the Director of the Transportation, Space, and Technology Program at the RAND Corporation in Santa Monica. He is now teaching courses and conducting research at UCLA in transportation policy and working on transportation policy projects at RAND.

Wachs is the author of 180 articles and wrote or edited five books on subjects related to transportation finance and economics, relationships between transportation, land use, and air quality, transportation needs of the elderly, techniques for the evaluation of transportation systems, and the use of performance measurement in transportation planning. His research

also addresses, equity in transportation policy, crime in public transit systems, and the response of transportation systems to natural disasters including earthquakes.

Dr. Wachs served on the Executive Committee of the Transportation Research Board (TRB) for nine years and was the TRB Chairman during the year 2000. He is the recipient of a Guggenheim Foundation Fellowship, two Rockefeller Foundation Humanities Fellowships, a UCLA Alumni Association Distinguished Teaching Award, the Pyke Johnson Award for the best paper presented at an annual meeting of the Transportation Research Board, and the Carey Award for service to the TRB. In January of 2010 he delivered the Thomas Deen Distinguished Lecture at the annual meeting of the TRB. In 2011 he received the Distinguished Transportation Researcher award from the Transportation Research Forum.

Appendix 3: Road Charge Workgroup Roster

Road Charge Workgroup Roster

Name	Organization	Title	Area of Representation
Anne Mayer (Chair)	Riverside County Transportation Commission	Executive Director	Regional Agency
Curt Augustine	Alliance of Automobile Manufacturers	Director of Policy & Government Affairs	Vehicle Manufacturers
Bruce Blodgett	San Joaquin Farm Bureau	Executive Director	Agricultural Industry
Emily Castor	Lyft	Director of Community Relations	Vehicle Users
Andrew Conway	California Department of Motor Vehicles	Chief, Registration Policy/Automation	State Agency
Joe Cruz	California State Council of Laborers	Legislative Director	Labor
Genevieve Cullen	Electric Drive Transportation Assoc.	Interim President	Electric Vehicle Manufacturers
Mike Downs	Downs Energy	President	Fuel Distributors
Silvio Ferrari	California Building Industry Association	Vice-President of Legislative Affairs	Building & Construction
Jay Friedland	Plug In America	Policy Director	Vehicle Users
Adam Geisler	Native American Advisory Council	Committee Member	Tribal Governments
Paul Granillo	Inland Empire Economic Partnership	President	Business & Economy
John Greaves	UPS – Central California	Transportation Operations Mgr.	Vehicle Users
Rob Gutierrez	California Tax Foundation (CalTax)	Director	Tax Payers
Susan Klassen	Sonoma County	Public Works Director	Local Agency
Rob Lapsley	California Business Roundtable	President	Business & Economy
Annie Nam	Southern California Assoc. of Governments	Goods Movement and Transportation Finance Manager	Business & Economy
Cathy Reheis-Boyd	Western States Petroleum Association	President	Fuel Distributors
Sharon Scherzinger	El Dorado County Transportation Commission	Executive Director	Rural Counties Task Force
Joshua Stark	Transform	State Policy Director	Sustainability and Social Equity
Dianne Steinhauser	Transportation Authority of Marin	Executive Director	Self-Help Counties
Allison Yoh	Port of Long Beach	Transportation Policy Manager	Business & Economy

Appendix 4: Operational Concept Details

Concept 1: Time Permit—User Perspective

How is road use recorded and reported? Motorists buy time permits to drive an unlimited number of miles for a given period of time (such as a year, half-year, quarter, or month).

When do I register and pay? The time permit should be purchased prior to the start of the period for which the permit is valid. When you neglect to do so, the state may allow the permit to apply retroactively for the time gap when vehicles were not covered. However, the state may assign a penalty if you go more than a certain number of days (grace period) without a valid permit / operational concept.

Where do I register and pay? You may be able to buy permits at the time of vehicle registration. In that case, they could be obtained at a DMV office location. You could also order them over the Internet or via a smartphone application. You may be able to buy time permits in a retail store in the form of a gift card. The gift card could have a secure scratch off number that you use to activate the time permit. This could be done using a smartphone app, Internet, or by a voice recognition system from any phone (which may be available in several languages).

What is it like to drive with a time permit? While the time permit is valid, you may drive as you normally do. The only information you need to remember is the end date of the permit. The state may provide an inside-the-windshield sticker that lets the motorist record the time permit expiration date (similar to an oil-change reminder sticker). These stickers may be packaged with time permit gift cards sold in retail outlets or could be ordered in advance by mail. You could also get a reminder from a smartphone app or Internet website (e-mail, text message, or automatic voice call reminder).

Concept 1: Time Permit—TAC Perspective

What are the technical options from which the TAC may choose for the pilot? If visual checks by officers are the primary method of enforcement, window stickers should be used. Otherwise, electronically registering the license plate number on the time permit is the only step necessary. That can be done by smartphone app, Internet, or telephone.

How will this concept be enforced? Either by visual checks of valid window permits by enforcement officers, or by electronic checks that a valid time permit is associated with the license plate number. Electronic checks may be automatic (by automatic license plate cameras mounted on enforcement vehicles or in stationary positions) or manual (enforcement officers type in license plate number into their computers).

What are the challenges or drawbacks of the time permit?

- The time permit is not distance-based. Because the time permit itself is a “sunk cost,” drivers may tend to drive more once it is purchased.
- Also, in order to prevent overuse of the road by drivers on the time permit, the cost for each permit category should be based on a relatively high number of miles driven per day in relation to the duration of the time permit.

Concept 2: Engine Run Time (not recommended) —User Perspective

How is road use recorded and reported? An in-vehicle device measures engine run time and reports it to an account manager. For some vehicle types (e.g., electric vehicles), an algorithm (speed>0) may be used to determine if the engine is running.

When do I register and pay? You register with an account manager before you drive the vehicle. The account manager gives you or a professional mechanic the equipment that must be installed by a professional mechanic. The account manager periodically invoices you for minutes of engine run-time.

Where do I register and pay? You may register online or by smartphone app. In addition, the account manager may have retail locations. If the account manager is the state, existing state offices, potentially DMV locations, may be used. Partner auto mechanic shops and dealers could be engaged.

What is it like to drive with an engine run time measurement device? The device will likely be unnoticeable to the driver, but drivers will become very aware of all minutes spent in the vehicle with engine running, because for every minute they are paying more.

Concept 2: Engine Run Time (not recommended) —TAC Perspective

What are the technical options from which the TAC may choose for the pilot? A new device would need to be developed that includes a vibration sensor or other sensor that detects when the motor is turned on and vehicle anchor (means of ensuring it is attached to the vehicle).

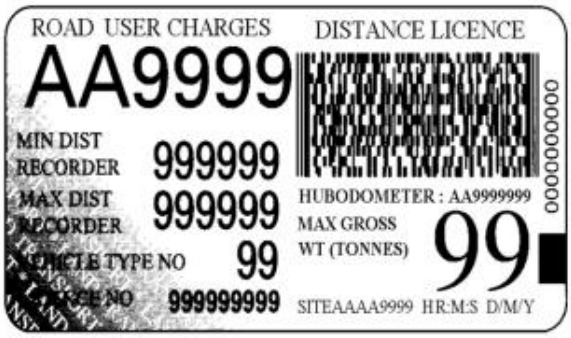
How will this concept be enforced? The device will be installed by a professional mechanic. It will be able to determine when it has been removed from the vehicle, and data on removals from the vehicle will be analyzed to determine likely violations.

What are the challenges or drawbacks?

- The device could be seen to encourage speeding and could cause motorist dissatisfaction with roadway infrastructure available. Also, a device designed for mass-production has not been developed yet.

- There is no straightforward mechanism to provide credits for out-of-state/off-road miles driven.
- Account managers may require motorists have a minimum credit score, thus potentially excluding some of the population.

Concept 3: Mileage Permit—User Perspective



How is road use recorded and reported? Roadway use is recorded by the vehicle odometer. It is reported when you buy a permit, authorizing your vehicle to be driven on the roadway network for a given number of miles.

When do I register and pay? You buy the mileage permit before driving your vehicle. If you neglect to do so, the state may allow the permit to be made retroactive for the miles (odometer gap) when the vehicle was not covered. The state may charge you a penalty if you drive more than a certain number of miles (grace distance) following the end of validity of the last mileage permit.

Where do I register and pay? You may be able to buy time permits at the time of vehicle registration. Thus, you could get them at a DMV office location. You could also order them over the Internet or via a smartphone app. You may be able to buy mileage permits in a retail store as a gift card. The mileage gift card could have a secure scratch off number that you would use to activate the mileage permit. This could be done using a smartphone app or over the Internet, or by a voice recognition system from any phone (which may be available in several languages).

What is it like to drive with a mileage permit? Motorists simply drive until the mileage on the permit is expired. Motorists may wish to have an inside-the-windshield sticker reminding them of the mileage at which it expires (similar to an oil-change reminder sticker). Such stickers could be provided with the mileage permit gift card option. Reminders could also come from a smartphone app or Internet website (e-mail, text message, or automatic voice call reminder).

Concept 3: Mileage Permit—TAC Perspective

What are the technical options from which the TAC may choose for the pilot? If visual checks by officers are the main method of enforcement, window stickers should be used. Otherwise, electronically registering the license plate number for the mileage permit is the only step necessary. That can be done by smartphone app, Internet, or phone.

How will this concept be enforced? An official odometer reading for each associated vehicle may be required before the motorist is enrolled in the mileage permit operational concept. In the case of newly purchased vehicles, this could be done by the dealer. In case of motorists switching from another concept, this could be done by an official or authorized representative. Enforcement will either be visual checks of window permits by enforcement officers, or electronic checks that

a valid time permit is associated with the vehicle. Electronic checks may be automatic (by license plate cameras mounted on enforcement vehicles or in fixed positions) or manual (enforcement officers type in license plate number on their computers).

What are the challenges or drawbacks?

- The potential for odometer fraud is a challenge.
- Another challenge is the legal requirement to notify motorists that their vehicle registration is about to expire—this requirement may extend to a potential mileage permit payment of a road charge. A potential solution is having an automated way for users to check the validity of their permit by entering their odometer reading on a smartphone app, or via phone.
- There is no straightforward mechanism to provide credits for miles driven out-of-state and on private roads.

Concept 4: Odometer Charge (post-pay)—User Perspective

How is road use recorded and reported? Roadway use is recorded by the vehicle odometer. You report an odometer reading, either a reading you make yourself, or an authorized agent of the state makes for you. If you report it yourself, you may do so by Internet, smartphone app, or mail-in postcard.

When do I register and pay? You register for the odometer charge before you commence driving. An official "start" odometer reading is recorded at the time of registration. No payment is required at that time—you pay at the end of the year, when renewing the registration for the concept, quarterly or monthly, depending on final design choices in a potential future road charging program.

Where do I register and pay? You may potentially register at the time of vehicle registration. If an odometer reading by an official is required, registration may be made at a DMV office or an authorized agent of the state (e.g., vehicle mechanic or dealer). If you report the odometer reading yourself, registration could be done over the Internet, via smartphone app, or via phone.

What is it like to drive with an odometer charge (post-pay)? You simply drive as you normally would.

Concept 4: Odometer Charge (post-pay)—TAC Perspective

What are the technical options? Odometer reporting by motorist (via web, smartphone app, phone, or mail-in postcard); or odometer inspection and reporting by official or authorized representative.

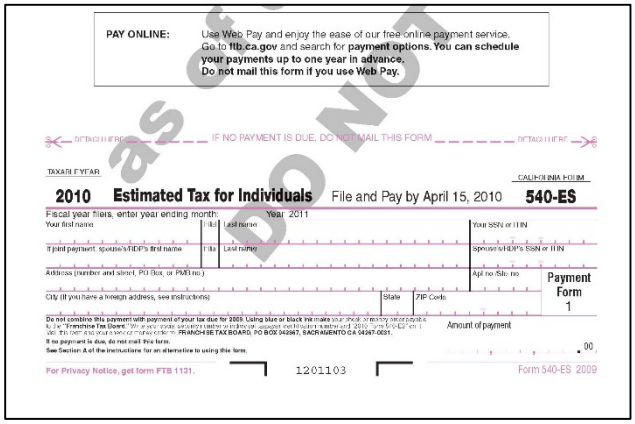
How will this concept be enforced? To ensure odometer readings are reported accurately in the case of self-reported odometer readings, spot odometer checks by enforcement officers may be employed. These spot checks could be combined with potential mandatory official odometer readings for a certain percentage of drivers. To discourage digital odometer tampering in the case

of either self-reported or officially reported odometer readings, reported odometer readings should be analyzed for suspicious behavior. In cases of suspicious behavior, audits of certain individuals, including looking for odometer reading records in repair shops they have used, and asking them questions about location of residence, employment, and driving habits, may be conducted.

What are the challenges or drawbacks?

- Potential for odometer fraud.
- No straightforward mechanism to provide credits for miles driven out-of-state and on private roads.
- Payment at the end of the year means a one-time transition to an annual post-pay mechanism, possibly leading to cash flow issues.
- Payment at the end of the year means that there is more opportunity for a motorist to move out-of-state and fail to pay road charges—while California could attempt to pursue the motorist with a penalty fine, such legal actions could be costly and time-consuming.

Concept 5: Odometer Charge (pre-pay) (not recommended) —User Perspective


PAY ONLINE: Use Web Pay and enjoy the ease of our free online payment service. Go to ftb.ca.gov and search for payment options. You can schedule your payments up to one year in advance. Do not mail this form if you use Web Pay.

IF NO PAYMENT IS DUE, DO NOT MAIL THIS FORM

TAXABLE YEAR 2010 **Estimated Tax for Individuals** File and Pay by April 15, 2010 CALIFORNIA FORM **540-ES**

Fiscal year filers, enter year ending month: Year 2011

Your first name | MI | Last name | Your SSN or ITIN

If joint payment, spouse's/RDP's first name | MI | Last name | Spouse's/RDP's SSN or ITIN

Address (number and street, PO Box, or PMB no.) | Apt no /Ste. no | Payment Form 1

City (If you have a foreign address, see instructions) | State | ZIP Code

Do not combine this payment with payment of your tax due for 2009. Using blue or black ink make your check or money order payable to the "Franchise Tax Board." Write your social security number or individual taxpayer identification number and "2010 Form 540-ES" on it. Mail this form and your check or money order to: FRANCHISE TAX BOARD, PO BOX 942867, SACRAMENTO CA 94267-0081.

If no payment is due, do not mail this form.

See Section A of the instructions for an alternative to using this form.

Amount of payment .00

For Privacy Notice, get form FTB 1131. 1201103 Form 540-ES 2009

as of DO NOT

How is road use recorded and reported? Roadway use is recorded by the vehicle odometer. You report an odometer reading, either a reading you make yourself, or an authorized agent of the state makes for you. If you report it yourself, you may do so by Internet, smartphone app, phone, or mail-in postcard.

When do I register and pay? You register and pay for the odometer charge before you commence driving. An official "start" odometer reading is recorded at the time you register, and you pre-pay at that time. You estimate a mileage for the next year based on state guidelines (e.g., mileage driven in previous years; 12,000 miles the first year), and pre-pay for that number of miles. At the end of the year, you reconcile or "true-up" the mileage payment:

- In the case of fewer miles traveled than estimated, you receive credit for mileage driven in the coming year.
- In the case of more miles traveled than estimated, you pay for the extra miles.
- In addition, you pre-pay for mileage estimated to be driven the following year.

Where do I register and pay? You potentially register at the time of vehicle registration. If an official odometer reading is required, you may be able to register at a DMV office location or location of an authorized agent of the state (e.g., vehicle mechanic). If a user-reported odometer reading is sufficient, you may register over the Internet, via smartphone application, or via phone.

What is it like to drive with an odometer charge (post-pay)? You simply drive as you normally would.

Concept 5: Odometer Charge (pre-pay) (not recommended) —TAC Perspective

What are the technical options? Reporting by motorist via web, smartphone app, phone, or mail-in postcard; or odometer inspection by official or authorized representative.

How will this concept be enforced? To ensure odometer readings are reported accurately in the case of self-reported odometer readings, spot odometer checks by enforcement officers may be employed. These spot checks could be combined with potential mandatory official odometer readings for a certain percentage of drivers. To discourage digital odometer tampering in the case of either self-reported or officially reported odometer readings, reported odometer readings should be analyzed for suspicious behavior. In cases of suspicious behavior, audits of certain individuals, including looking for odometer reading records in repair shops they have used, and asking them questions about location of residence, employment, and driving habits, may be conducted.

What are the challenges or drawbacks?

- Potential for odometer fraud.
- No straightforward mechanism to provide credits for out-of-state/off-road miles driven.
- Potential for low pre-payments, depending on rules for mileage estimation adopted.
- This challenge could be resolved by requiring motorists who substantially exceed their estimated mileage to true-up early (when they exceed a maximum mileage beyond their estimated mileage), or to face a penalty if they do not do so.

Concept 6: Automated distance Measurement (no location data)—User Perspective

When do I register and pay? You register with an account manager before you drive. In case of usage-based insurance devices, the account manager provides equipment, and you install it. In the case of other location-based devices, the account manager provides equipment, and a mechanic installs it. In the case of smartphone or telematics, you install and set up the app in your smartphone or vehicle, respectively. The account manager periodically invoices you for miles driven, and you pay those invoices by the means provided by the account manager, typically credit/debit, bank transfer, or check.

Where do I register and pay? You may register online or by smartphone app with an account manager. In addition, the

account manager may have retail locations. If the account manager is the state, you may register at existing state offices, potentially DMV locations.

What is it like to drive with an automated distance measurement device? You probably won't be able to notice the device. Compared with driving under the gas tax, you may be more aware that each mile costs money. Thus you may choose more optimal routes, take shorter trips or combine trips more often. You may also have access to value-added services with the device.

Concept 6: Automated Distance Measurement (no location data)—TAC Perspective

What are the technical options? Usage-based insurance type devices, smartphones, telematics, and other location-based devices, discussed individually below.

How will this concept be enforced? In the case of usage-based insurance type devices, the account manager and/or the state will monitor the signals sent by your distance-measurement device to determine that it was always in the vehicle and active when you were driving the vehicle. In cases of suspicious activity (lengthy and/or frequent device removals), the state may audit you (ask questions justifying said removals). In the case of smartphones, the same measures are taken as for odometer readings. It is difficult to commit fraud with telematics and other distance measurement devices.

What are the challenges or drawbacks?

- Account managers may require that motorists have a minimum credit score, thus potentially excluding some of the population.
- There is no straightforward mechanism to provide credits for miles driven out-of-state and on private roads.

Concept 7: Automated Distance Measurement (general location)—User Perspective

How is road use recorded and reported? An in-vehicle device measures the distance you drive and reports it to an account manager.

When do I register and pay? You register with an account manager before you drive. In case of usage-based insurance devices or other location-based devices, the account manager provides equipment, and you install it in the case of usage-based insurance type devices, or a mechanic installs it, in the case of other location-based devices. In the case of smartphone or telematics, you install and set up the app in your smartphone or vehicle, respectively. The account manager periodically invoices you for miles driven, and you pay those invoices by the means provided by the account manager, typically credit/debit, bank transfer or check.

Where do I register and pay? You may register online or by smartphone app with an account manager. In addition, the account manager may have retail locations. If the account manager is the state, you may register at existing state offices, potentially DMV locations.

What is it like to drive with an automated distance measurement device? You probably won't be able to notice the device. Compared with driving under the gas tax, you may be more aware that each mile costs money. Thus you may choose more optimal routes, take shorter trips or combine trips more often. You may also have access to more value-added services with the device. You may have the opportunity to turn the use of location data on and off through the device.

Concept 7: Automated Distance Measurement (general location)—TAC Perspective

What are the technical options? User based insurance type devices, smartphones, telematics, and other location-based devices, discussed individually below.

How will this concept be enforced? In the case of usage based insurance type devices, the account manager and/or the state will monitor the signals sent by your distance-measurement device to determine that it was always in the vehicle and active when you were driving the vehicle. In cases of suspicious activity (lengthy and/or frequent device removals), the state may audit you (ask questions justifying said removals). In the case of smartphones, the same measures are taken as for odometer readings. It is difficult to commit fraud with telematics and other distance measurement devices.

What are the challenges or drawbacks?

- Account managers may require motorists have a minimum credit score, thus potentially excluding some of the population.

Appendix 5: Technological Options

Technology: Mileage Meter (OBDII) Device

Mileage Meter installation and service set up: Volunteers who select this technology will receive the device in the mail with instructions on how to install it. On most vehicles the OBDII port can easily be located with the guidance provided in the instructions. In cases where the OBDII port cannot be located, the account manager may provide a hotline phone number to customer service representatives who can provide descriptions of the locations of OBDII ports on all makes and models of vehicles, and can assist in locating the OBDII port. When an account is created with the account manager, all setup steps can be completed. Once the device is plugged in and the vehicle is turned on, the OBDII sends a signal to the account manager completing the setup process.

Mileage Meter unique requirements or features: The device must be removed when the vehicle is serviced and plugged back in afterward. An automatic notification can be sent to the motorist if the device has been left out of the vehicle for a long time. The variety of value-added services that may be available with the device include but are not limited to the following:

Usage-based insurance in which the premium varies by total miles driven (one of the few premium modifications allowed under California insurance code);
Integration with tolling payments; driving guidance (for young drivers or those attempting to drive more ecologically)
Geo-fencing (for parents with young drivers whose movements they wish to monitor)
Automatic diagnostics are among the value-added services possible with this device.

Technology: Smartphone

Smartphone installation and service set up: A road charging app would be installed on the driver's smartphone as would be done with any other app. A sign up process (name, address, payment details) is then completed and the phone is paired with the vehicle via Bluetooth. Finally, the driver takes a picture of the vehicle odometer to start the process. It should be possible to pair one phone with two or more different vehicles. Similarly, it should be possible to pair two or more phones with one vehicle though an option to link accounts.

Smartphone unique requirements or features: After the first Bluetooth pairing, future pairing of the phone to the vehicle should be automatic whenever the phone is in the vehicle and has power. Since each vehicle has a unique Bluetooth address, the phone will only ever pair to that vehicle—it will not pair with and charge for travel for any other vehicle in which it may be located. Occasionally, the driver will be required to take a picture of the odometer with the phone while it is paired to the vehicle via Bluetooth. If the driver wishes to use automated reporting with general location, the phone must be in the vehicle and have sufficient battery power.

Technology: Telematics

Telematics installation and service set up: The road charging app would be downloaded from the telematics service's app store and installed it like any other app. Then the driver/vehicle owner completes the signup process (name, address, payment details).

Telematics unique requirements or features: The use of location data may be enabled or disabled directly through the telematics app. The driver/vehicle owner may also be able to view account details directly through the telematics app.

Technology: Commercial Vehicle Mileage Meters

Vehicle Mileage Meters installation and service set up: Commercial Vehicle Mileage Meters (devices that use location based technology and are mechanically and electrically anchored to the vehicle, typically truck tolling devices) must generally be installed by professional mechanics. The driver/vehicle owner will separately complete the signup process (name, address, payment details).

Vehicle Mileage Meter unique requirements or features: Such devices are generally designed for commercial vehicles and may provide a range of applications appropriate for commercial vehicle fleets.

Appendix 6: Pilot Participant Matrix Details

Participant matrix

		North	Central	South	Trucks
Commercial Vehicles (Businesses)		100	50	175	50
Private Vehicles (Individuals & Households)					Other
Urban & Suburban	$	475	175	1050	125
Urban & Suburban	$$	475	175	1050	
Rural & Agricultural	$	200	200	150	
Rural & Agricultural	$$	200	200	150	

Private passenger cars

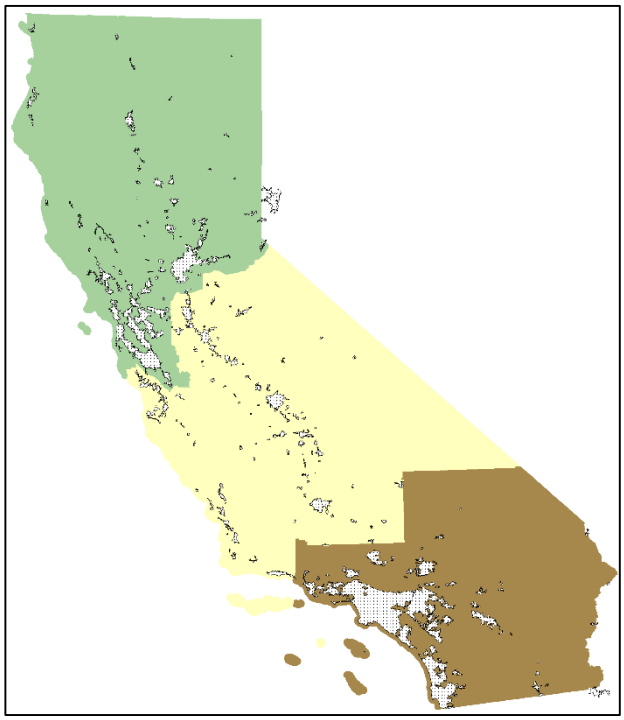
The tables below summarize additional targets recommended by the TAC for the private passenger cars component of the matrix (the lower left quadrant, comprising individuals and households).

Vehicle Location	Pilot	%	Actual %
Urban/Suburban	3,400	76%	94%
Rural/Agricultural	1,100	24%	6%

For purposes of pilot categorization, the TAC recommends that urban/suburban be defined as U.S. Census Urban Areas and Urban Clusters, while rural/agricultural be defined as “everything else.” Participants may additionally self-select their location as one or the other.

Vehicle Region	Pilot	%	Actual %
Northern	1,350	30%	28%
Central	750	17%	15%
Southern	2,400	53%	57%

The map below captures both urban vs. rural areas (urban areas are shaded white as an overlay on the map of California) and Northern (green), Central (yellow), and Southern (brown) designations.



Household Income	Pilot	%
< Median	2,250	50%
> Median	2,250	50%

In addition the TAC recommends targeting 25% of private passenger car participants at or below the "Very Low" cutoff, per Department of Housing and Community Development's definition.

Motorist Age	Pilot %	Actual %
16-45	>27%	54%
45-65	>16%	32%
>65	>7%	14%

Motorist Gender	Pilot %	Actual %
Female	>40%	50%
Male	>40%	50%

Vehicle Type	Pilot	Pilot %	Actual %
Hybrid	>100	>2%	2.5%
Electric	>20	>0.5%	0.5%

Motorist Ethnicity	Pilot %	Actual %
White	>20%	39%
Hispanic	>19%	38%
Asian	>7%	14%
Black	>4%	7%

Operational concept	Minimum per sub-group	Minimum across all passenger cars
Time permit	2	36
Mileage permit	2	36
Odometer charge (prepay or postpay)	5	90
Automated distance charge (no location)	5	90
Automated distance charge (general location)	5	90

Light-duty commercial vehicles

The TAC recommends recruiting light-duty commercial vehicles in accordance with the details outlined in the table below.

Location	Target number of participating vehicles	% of total light-duty commercial participants	Actual % of total statewide businesses
Northern	100	31%	30%
Central	50	15%	11%
Southern	175	54%	58%

Medium and heavy commercial trucks

The TAC did not originally contemplate medium and heavy commercial trucks for inclusion in the pilot. Under a strict interpretation of SB 1077, the legislation does not call for trucks to participate. However, the California Trucking Association volunteered to participate in the pilot test in order to gather direct experience and information about how the system might work so that they and their members could provide more informed feedback to the process. The TAC agreed with the California Trucking Association's decision to volunteer. Following this decision, California Trucking Association identified 50 as the minimum number of trucks to target for participation across nine industry segments as summarized below. The TAC affirmed the 50-vehicle target and nine industry segments as part of its recommendation.

1. Large integrated fleet
2. Large private fleet
3. Owner/operator – intermodal
4. Owner/operator – over the road
5. Agriculture – exporters
6. Agriculture – seasonal operators
7. Agriculture – private fleet
8. Construction
9. Energy
10. Other vehicles

The TAC also recommended including agency vehicles (from at least one government agency), vehicles registered out-of-state, and vehicles registered to Native Americans living on tribal lands as volunteer participants in the pilot.

Appendix 7: Evaluation Criteria

TAC-Recommended Goals and Pilot Evaluation Criteria – Revenue Category

Category	Goals	Evaluation Criteria
Revenue	Create a revenue stream that is able to match the fuel tax at time of implementation	Ability of Road Charge revenue to match fuel tax revenue at time of implementation
	Avoid double taxation of Road Charge and fuel tax	Ability to credit fuel taxes paid against Road Charges owed for pilot participants

TAC-Recommended Goals and Pilot Evaluation Criteria – Cost Category

Category	Goals	Evaluation Criteria
Cost	► Administer Road Charges efficiently ► Incorporate cost efficiencies where available	Estimated agency cost of administering a statewide Road Charge based on relevant cost data from the pilot
		Estimated agency cost of administering a statewide Road Charge based on relevant costs from the pilot, relative to fuel taxes
	Provide users with low-cost compliance options	Costs incurred by motorists in recording and reporting highway use
	Implement projects on time and on budget	Completion of pilot project milestones relative to schedule required in SB 1077
		Final pilot project expenditures relative to cost estimate following TAC final report at end of 2015

TAC-Recommended Goals and Pilot Evaluation Criteria – Operations Category

Category	Goals	Evaluation Criteria
Operations	► Be easy to administer ► Clearly identify responsibilities	Ease of administering collection of Road Charges
		Adherence of all pilot vendors and administrators to operations responsibility matrix
	► Maintain compliance ► Be enforceable	Effectiveness of methods for encouraging voluntary compliance
		Resistance of methods to tampering and fraud
		Quality/accuracy of road use data reported
	Have neutral behavior impacts	Changes in individual road use behavior
		Changes in collective road use behavior
	Integrate with other charges	Ease of administering interoperability with other jurisdictions
	Optimize collection of charges in accordance with enforcement features recommended by the TAC	Difference between expected and realized revenue per mile
		Implementation of and adherence to enforcement features recommended by the TAC
	Be compliant with financial guidelines	Auditability of accounts
		Auditability of account managers

TAC-Recommended Goals and Pilot Evaluation Criteria – User Experience Category

Category	Goals	Evaluation Criteria
User Experience	Administer Road Charges effectively	Users' ease of recording and reporting highway use
		Quality/accuracy of highway use data reported
	Allow user choice	User acceptance of methods available
		Market availability of methods
	Keep pace with change over the long term	Openness of system architecture for future providers
		Long-term ability of methods to incorporate other services
	Provide methods that are available, adaptable, reliable, and secure	IT availability of methods
		Long-term adaptability of methods to changing technologies
		Reliability of methods
		Security of methods
	Be transparent about how charge works	User understanding of system, including choices, operations, and invoices
	Do not negatively impact safety	Incidence of safety issues related to Road Charging

TAC-Recommended Goals and Pilot Evaluation Criteria – Privacy Category

Category	Goals	Evaluation Criteria
Privacy	Honor personal privacy through privacy policies	User perception of privacy protections
	Protect personally-identifiable information	Protection of personally-identifiable information in accordance with principles adopted by the TAC
	Ensure identity protection using location data even after removal of personally-identifiable information	
	Ensure privacy protection when using location data with other technologies	
	Protect privacy pursuant to Article I Section 1 of the California Constitution with respect to data access by public agencies (including law enforcement) and private firms	Protection of privacy, including implementation and operation of procedures, in accordance with principles adopted by the TAC
	Respect user privacy trade-offs	Ability of the system to accommodate user privacy preferences and choices relative to opt-in services

TAC-Recommended Goals and Pilot Evaluation Criteria – Data Security Category

Category	Goals	Evaluation Criteria
Data Security	Honor personal privacy through data security	User perception of data security
	► Ensure data are secure from external breaches ► Ensure data are secure from internal breaches ► Ensure data are secure from abuse based on internal process exposure	Ability of system to withstand breaches or attacks
		Protection of data in accordance with TAC direction on data security
		Availability of data for appropriate and necessary uses
		Conformity with relevant ISO 9000 data security standards
		Conformity with relevant ISO 27001 data security standards

TAC-Recommended Goals and Pilot Evaluation Criteria – Equity Category

Category	Goals	Evaluation Criteria
Equity	Be fair and equitable	User perception of equity, relative to fuel taxes
	Preserve or improve horizontal equity (relative to fuel taxes), which provides that people of similar abilities to pay would pay at the same (effective) rates	Road Charges and compliance costs incurred, by distance traveled, relative to fuel taxes
		Road Charges and compliance costs incurred, by vehicle type, relative to fuel taxes
	Preserve vertical equity (relative to fuel taxes), which provides that people of differing abilities to pay would pay at different (effective) rates	Road Charges and compliance costs incurred, by household income, relative to fuel taxes
	Preserve or improve spatial equity (relative to fuel taxes)	Road Charges and compliance costs incurred, by location, relative to fuel taxes: North, Central, South; urban/suburban, rural/agricultural; in-state, out-of-state
	Preserve or improve procedural equity (relative to fuel taxes)	Road Charges and compliance costs incurred, by method chosen, relative to fuel taxes

TAC-Recommended Goals and Pilot Evaluation Criteria – Communications Category

Category	Goals	Evaluation Criteria
Communications	Engage the public meaningfully	Opportunities for participant feedback
		Opportunities for general public feedback
		Participant satisfaction with interactions and feedback opportunities

Appendix 8: Model Privacy Protection Principles

California Road Charge Privacy Protection Provisions

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SECTION 1. Findings and intent

The privacy protection provisions in this Act are based on the following findings and declarations:

(a) The road charge pilot must at all times recognize and respect an individual's interests in privacy, information use, and civil liberties pursuant to Section 1 of Article I of the California Constitution. {Privacy Principle 1}; {SB 34 (2014), 1798.90.51 (b)(1).}

(b) Experience to date in other states across the nation demonstrates that mileage-based charges can be implemented in a way that ensures data security and maximum privacy protection for drivers. {SB 1077}

(c) Any exploration of alternative revenue sources shall take privacy implications into account, especially with regard to location data. Trip origins, destinations, times of travel and routes shall not be reported, and legal and technical safeguards shall protect personal information. {SB 1077}

(d) The practice of bundling user fees for roads and highways into the gas tax makes it difficult for motorists to understand the amount they are paying for roads and highways. {SB 1077}

(e) The road charge system must be designed, implemented and administered in a manner transparent to the public and to individual motorists. {Privacy Principle 4}

SECTION 2. Definitions

The following terms and definitions shall apply to this Act:

(a) "Breach of the security of the system" means unauthorized acquisition of computerized data that compromises the security, confidentiality, or integrity of personal information maintained by the department or a road charge account manager. Good faith acquisition of personal information by an employee or agent of the department or road charge account manager for the purposes of administering road charges is not a breach of the security of the system, provided that the personal information is not used or subject to further unauthorized disclosure. {California Online Privacy Protection Act}

(b) "Department" means the department of transportation, the department of motor vehicles and any other state department designated by the legislature or the California state transportation agency to participate in the administration of a road charge program.

(c) "General location data" means information about whether a vehicle has traveled on taxable roadways within the state of California.

(d) "Mileage recording" means the act or process of measuring and storage vehicle mileage driven.

(e) "Mileage reporting" means the act or process of transmitting vehicle mileage driven data.

(f) "Motorist" means a person who drives a vehicle that is subject to road charge payment, recording or reporting, whether or not that person is the registered owner.

(g) “Personal information” means any information about an individual which, on its own or when combined with other information, is reasonably capable of revealing the identity or activities of a specific person. Personal information includes, but is not limited to: trip making details, address, telephone number, email address, license plate number, driver’s license number, California identification card number, account number, social security number, photograph, bank account information, or credit card number.

For purposes of this Act, "personal information" does not include publicly available information that is lawfully made available to the general public from federal, state, or local government records.

(h) “Public purposes” means research, testing and information gathering that advances the safety of the motoring public and the adequate preservation, maintenance and upkeep of public roadways.

(i) “Registered owner of a vehicle” has the same meaning as [cite to CA law that defines owners to include lessees].

(j) “Road charge” means a fee collected from the registered owner of a vehicle that is paid in lieu of the per-gallon retail price of motor fuel attributable to state motor fuel taxes.

(k) “Road charge account manager” means a public agency or private vendor that has been certified by the state of California to administer the collection of road charge payments from registered vehicle owners.

(l) “Specific location data” means information about the origin, destination, waypoint, or specific route of travel of a motor vehicle.

SECTION 3. Motorist choice of road charge mileage reporting methods

(a) The road charge system must allow motorists to choose from at least two methods for how vehicle mileage will be reported for road charge tax accounting purposes. {Privacy Principle 3}

(b) In providing mileage-reporting options, the road charge system must provide at least one method that does not require use of general or specific locational information, including specific origins or destinations, trip frequencies or times of travel. {Privacy Principle 10}

SECTION 4. Non-mileage based road charge methods must be provided

(a) In addition to the methods provided under section 3 of this Act, the road charge system must offer motorists a time-based method of paying for road use, as an alternative payment method for motorists concerned about disclosing their vehicle mileage driven. {Privacy Principle 2}

(b) The time-based road charge method must not require any personal information beyond that required to legally register a motor vehicle under [cite to state motor vehicle registration requirements]. {TAC Meeting Discussions}

SECTION 5. Disclosure of data to be collected by road charge software and devices

(a) Any third-party provider of software, devices or mechanisms offered for motorists' use in recording or reporting vehicle mileage traveled for purposes of calculating road charges must clearly and fully disclose all known information and data that such software, devices or mechanisms are intended to record or report. This disclosure must be given to motorists:

(1) at the time of motorists' initial selection of road charge reporting methods;

(2) when software, devices or mechanisms are provided to the motorist for use; and

(3) at least annually, as part of the transmittal of an account manager's road charge privacy policy, required under section 17 of this Act. {Privacy Principle 4}

(b) In lieu of subsection (a) of this section, automotive manufacturers that offer their customers with optional road charge reporting services that utilize in-vehicle telematics technologies may provide disclosure of data recording and reporting capabilities in the owners' manual that is provided with the original purchase of the vehicle; or upon the motorist's activation or subscription to the optional road charge reporting services.

(c) In providing motorists the choice of road charge reporting methods as required in section 3(a) of this Act, the department and any road charge account manager authorized by the state to administer or collect road charges must provide a clear description of the type of personal information and data that is required for each reporting method, and must provide a comparison of the benefits and personal privacy-related tradeoffs for each of the available reporting methods. This information must be provided prior to a motorist's selection of a road charge payment method. {TAC Meeting Discussions}

SECTION 6. Limitations on the collection and reporting of personal information

(a) The Road Charge system shall not collect any personal information beyond what is necessary to properly calculate, report and collect the road charge, unless the motorist provides his or her express written consent for the collection of additional information in a manner consistent with section 7 of this Act. {Privacy Principle 7} {California Information Practices Act, Civil Code section 1798} {SB 1077}

(b) Road charge reporting methods shall not record or report specific location data, including origins, destinations, waypoint locations, trip frequencies or times of travel unless a motorist specifically consents to the recording or reporting of such location data in a manner consistent with section 7 of this Act. {SB 1077} {Privacy Principle 10}

(c) Road charge reporting methods may record or report general location data as that term is defined in section 1 of this Act, provided:

(1) the motorist chooses that specific reporting method;

(2) proper disclosure of the reporting method was made pursuant to section 5 of this Act; and

(3) the motorist specifically consents to the reporting of general location in a manner consistent with section 7 of this Act.

SECTION 7. Express written permission required to collect location information and to share other personal information

Motorists who consent to the release of personal information, or who consent to the recording or reporting of general or specific location data must provide their consent in a clear, unambiguous and written manner. {Privacy Principle 9}

SECTION 8. Road charge information and data to be de-identified wherever possible

(a) Road charge system data retained beyond the period of time necessary to ensure proper mileage account payment must have all personal information removed, and may only be used for public purposes as defined in section 2(h). {Privacy Principle 8}

(b) This section does not prohibit the department or a road charge account manager from providing aggregated traveler information derived from collective data that relates to a group or category of persons from which personal information has been removed. {California Electronic Toll Collection law, Streets and Highway Code section 31490}

(c) If the department or a road charge account manager provides aggregated or de-identified data for public purposes, the department or road charge account manager must first consider the ease of re-identifying location data, even when personal information has been removed from the data, before authorizing release of that data for public purposes. {SB 1077}; {TAC discussions}

SECTION 9. Duty to protect personal information

The chief information technology officer for each department with responsibility to administer the road charge system in whole or part, and any road charge account manager, has an affirmative public duty to:

(a) Ensure that road charge information is protected with reasonable operational, administrative, technical, and physical safeguards to ensure its confidentiality and integrity;

(b) Implement and maintain reasonable security procedures and practices in order to protect road charge information from unauthorized access, destruction, use, modification, or disclosure; and

(c) Implement and maintain a usage and privacy policy as specified in section 17 of this Act in order to ensure that the collection of road charge information is consistent with respect for individuals' privacy and civil liberties. {SB 34 (2014) relating to locational privacy}

SECTION 10. Limitation on the disclosure and transmission of personal information

(a) Personal information required for the road charge system shall not be disclosed to any persons or entities without (1) motorists' consent, (2) specific statutory authority authorizing

disclosure, (3) appropriate legal due process, or (4) emergency circumstances as defined in law. {Privacy Principle 6}

(b) Personal information may be provided for the following purposes:

(1) The department and a road charge account manager may exchange personal information for the purpose of facilitating the motorist's choice in method of road charge payment, setup of the motorist's road charge account, and managing the accounting and collection of charges. {Oregon SB 810}

(2) (A) The department or a road charge account manager may make personal information of a person available to a law enforcement agency only pursuant to a search warrant. Absent a provision in the search warrant to the contrary, the law enforcement agency shall immediately, but in any event within no more than five days, notify the person that his or her records have been obtained and shall provide the person with a copy of the search warrant and the identity of the law enforcement agency or peace officer to whom the records were provided. {California Electronic Toll Collection law, Streets and Highways Code section 31490 (e)(1)} {SB 1077}

(B) This section does not prohibit a peace officer, [as defined in Section 830.1 or 830.2 of the Penal Code], when conducting a criminal or traffic collision investigation, from obtaining personal information of a person if the officer has good cause to believe that a delay in obtaining this information by seeking a search warrant would cause an adverse result, as defined in [subparagraphs (A) to (E), inclusive, of paragraph (2) of subdivision (a) of Section 1524.2 of the Penal Code.] {California Electronic Toll Collection law, Streets and Highways Code section 31490 (e)(2)}

(3) This section does not prohibit the department or a road charge account manager from performing financial and accounting functions such as billing, account settlement, enforcement, or other financial activities required to operate and manage the road charge system. This section does not prohibit the sharing of data between state agencies, road charge public agencies in other states, and their road charge account managers for the purpose of properly accounting for mileage or allocation of road charge revenue between those state agencies or account managers. {California Electronic Toll Collection law, Streets and Highways Code section 31490 (i)}

(4) This section does not prohibit the department or a road charge account manager from communicating, either directly or through a contracted third-party vendor, to motorists enrolled in the road charge system about products and services offered by the agency, a business partner, or the entity with which it contracts for the system, using personal information limited to the subscriber's name, address, and electronic mail address, provided that the department or road charge account manager has received the motorist's express written consent to receive the communications. {California Electronic Toll Collection law, Streets and Highways Code section 31490 (j)}

SECTION 11. Road charge data is confidential, not subject to disclosure

Personal information acquired for testing, development or operation of a road charge system is specifically exempt from California's public disclosure law, [cite to code]. {Privacy Principle 6}

SECTION 12. Record of access to motorists' account information

If the department or a road charge account manager accesses, or provides access to a motorist's account information, the department or a road charge account manager shall maintain a record of that access. At a minimum, the access control log shall include all of the following:

(a) The date and time the information is accessed;

(b) The license plate number, VIN number or other data elements used to query the road charge database or system;

(c) The person who accesses the information; and

(d) The purpose for accessing the information.

{California Senate Bill 34 (2014), relating to locational privacy, section 1798.90.52}

SECTION 13. Data security requirements

Road charge system data must be secured to ensure the protection of privacy and the integrity of road charge data collected. The department or a road charge account manager must establish information and data security standards and practices that represent best information technology industry practices, including data encryption and conformity with applicable ISO data security standards. {SB 1077}

SECTION 14. Disclosure and notice of security breach

(a) Any agency or road charge account manager that owns, manages, receives or transmits personal information obtained from motorists enrolled in the road charge system must disclose any breach of the security of the system following discovery or notification of the breach in the security of the data to any resident of [California] whose unencrypted personal information was, or is reasonably believed to have been, acquired by an unauthorized person. The disclosure shall be made in the most expedient time and manner possible and without unreasonable delay, consistent with the legitimate needs of law enforcement, as provided in [section 1798.29 of the California Civil Code], or any measures necessary to determine the scope of the breach and restore the reasonable integrity of the data system.

(b) Requirements for disclosure of data security breaches must conform to the provisions of [California Civil Code Section 1798.29 and 1798.82.] {California Senate Bill 34 (2014) relating to locational privacy}

SECTION 15. Limitation on the retention of data and requirement for data destruction

(a) Road charge system data retained beyond the period of time necessary to ensure proper mileage account payment must have all personal information removed, and may only be used for public purposes as defined in section 2(h) of this Act. {Privacy Principle 8}

(b) The department or a road charge account manager, within practical business and cost constraints, may store only personal information of a person such as, to the extent applicable, the account name, credit card number, billing address, vehicle information, and other basic account information required to perform account functions such as billing, account settlement, or enforcement activities. All other information shall be discarded no more than 30 days after payment processing, dispute resolution for a single reporting period or a non-compliance investigation, whichever period is latest. The department and road charge account managers shall destroy data related to the location and daily mileage use of any subject vehicle after the billing cycle has concluded, the bill has been paid, and all road charge disputes or violations, if applicable, have been resolved. {California Electronic Toll Collection law, Streets and Highways code section 31490}; {Oregon SB 810, Section (4)(b)}

(c) The department or a road charge account manager shall make every effort, within practical business and cost constraints, to purge the personal account information of an account that is closed or terminated. In no case shall the department or a road charge account manager maintain personal information more than 30 days after the date an account is closed or terminated. {California Electronic Toll Collection law, Streets and Highways code section 31490}

SECTION 16. Motorists' right to inspect records

(a) The road charge system must be designed, implemented and administered in a manner transparent to the public and to individual motorists. {Privacy Principle 4}

(b) The road charge system must allow motorists an opportunity to view all personal data being collected and stored to ensure only data required for proper accounting and payment of road charges is being collected and retained. {Privacy Principle 11}

(c) The department or a road charge account manager must publish the process by which a motorist may review and request changes to any of his or her personal information. {California Electronic Toll Collection law, Streets and Highways code section 31490 (b)(5)}

SECTION 17. Establishment of privacy policy required

(a) The department and all road charge account managers providing services to the state must establish, publish and adhere to a usage and privacy policy. The usage and privacy policy shall be available in writing, and shall be posted conspicuously on the department and road charge account managers' Internet website.

(b) The usage and privacy policy shall, at a minimum, include all of the following:

(1) The authorized purposes for collecting road charge information.

(2) A description of the employees and independent contractors who are authorized to access road charge system data and to collect personal information. The policy shall identify the training requirements necessary for those authorized employees and independent contractors.

(3) A description of how the use of road charge data collection will be monitored to ensure compliance with all applicable privacy laws and a process for periodic system audits, including any audits of the system access log required to be maintained under section 12 of this Act.

(4) A description of reasonable measures that will be used to ensure the accuracy road charge information and a process to correct data errors.

(5) A description of how the department and road charge account managers will comply with the security procedures and practices implemented and maintained pursuant to section 13 of this Act.

(6) The length of time road charge data and account information will be stored or retained.

(7) The official custodian of road charge system data and information, and which employees and independent contractors have the responsibility and accountability for implementing this section.

(8) The purpose of, and process for, sharing or disseminating road charge system information with other persons, whether by the department or road charge account managers in accordance with this Act, or by motorists through their express written consent pursuant to section 7 of this Act. {California Senate Bill 34 (2014) relating to locational privacy, section 1798.90.51(b)(1).}

SECTION 18. Penalties for willful breach of duty

(a) In addition to any other sanctions, penalties, or remedies provided by law, an individual who has been harmed by a violation of this Act may bring a civil action in any court of competent jurisdiction against a person who knowingly caused that violation.

(b) The court may award a combination of any one or more of the following:

(1) Actual damages, but not less than liquidated damages in the amount of two thousand five hundred dollars ($2,500).

(2) Punitive damages upon proof of willful or reckless disregard of the law.

(3) Reasonable attorney's fees and other litigation costs reasonably incurred.

(4) Other preliminary and equitable relief as the court determines to be appropriate. {California Senate Bill 34 (2014) relating to locational privacy, section 1798.90.54}

SECTION 19. Internal Audit and Certification of Compliance

The department and any road charge account manager shall adopt a comprehensive compliance program that is designed to ensure compliance with all provisions of this Act. The department's internal auditor, and a road charge account manager's internal or external auditor as the case may be, must include in their annual audit report a certification of compliance with the provisions of this Act. The certification of compliance must be made annually, and must be made available to the public on the department or road charge account manager's internet web site.

Appendix 9: Data Security Measures

Authentication is the process used to verify that users (people or devices) are who they say they are.[19] A representative example is Username/Password.

Authorization. While authentication means verifying "you are who you say you are," authorization means verifying "you are permitted to do what you are trying to do". Authentication is thus a prerequisite for authorization.[20] A representative example is strongly defined authorized user and administrator roles and permissions.

Encryption. In cryptography, encryption is the process of encoding messages or information in such a way that only authorized parties can read it. Encryption involves encoding a message with a special number called a key. Encryption does not prevent a message from being intercepted, but denies the message content to the interceptor.[21] A representative example is the encryption protocol standard called Advanced Encryption Standard (AES). It is now commonly executed in using a 256-bit encryption key, and thus referred to as 256-bit AES.

Data Modification Notification involves notification of users that their file(s) (including all component data) has (have) changed. A representative example is an email from a company saying that your account has changed.

Data Masking is hiding sensitive original data with random characters or data. An example is a credit card number appearing as XXXX XXXX XXXX 1234 on websites or apps.

Data Storage security involves applying the above principles (authentication, authorization, encryption), and other measures to ensure that all data on a computer system are stored securely.

Data Transmittal security means applying the principles of secure data storage to data transmission: using authentication, authorization, and encryption to transmit personally identifiable information / secure data from one system to another.

Data Destruction requires erasing all data (overwriting data, including associated files or database records, with meaningless information). This is more secure than simply "deleting" data, which typically means that only the beginning of a file is erased.

General IT network security encompasses all means by which information and services are protected from unintended or unauthorized access, change, or destruction.[22] Representative examples include firewalls, intrusion detection, anti-virus, and anti-malware.

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[19] Op. cit. 2

[20] Wikipedia. Authentication. Downloaded on June 27, 2015. Available at: https://en.wikipedia.org/wiki/Authentication.

[21] "Encryption Basics | EFF Surveillance Self-Defense Project." Encryption Basics | EFF Surveillance Self-Defense Project. Surveillance Self-Defense Project, n.d. Web. 06 Nov. 2013. <https://ssd.eff.org/tech/encryption>.

[22] "Reliance spells end of road for ICT amateurs", The Australian, May 07, 2013.

Appendix 10: Enforcement and Compliance Considerations

Violation Detection Procedures

Violation detection procedures vary by operational concept. There are three groups of violation detection activities by operational concept, as follows:

- Time permit
- Mileage permit and odometer charges
- Automated mileage recording and reporting

Violation Detection Procedures – Time Permit

Time permit enforcement activities will vary depending on whether the time permit requires only registration of the time permit with a license plate number via phone, internet, smartphone application, or at a retail location, or whether the time permit also requires a physical decal or sticker (e.g., on the windshield, rear window, or license plate).

Because in a live, operational system, having electronically registered time permits are less costly and easier to enforce uniformly, *it is suggested for the purpose of the pilot that time permits are administered through electronic registration*. When registered electronically, the database of time permit holders can be automatically checked to see which permits are nearly expired or fully expired. If no electronic record exists, enforcement can only be performed by officers who visually inspect vehicles.

Enforcement of time permits that consist entirely of physical decals (no registration in the road charge database) consists of spot enforcement by police officers.

Enforcement of electronic time permits involves a daily automated scan of the road charging database to detect the following:

- Time permits that are close to expiring
- Time permits that have just expired but are still within any established grace period
- Time permits that are expired and in violation of the road charge

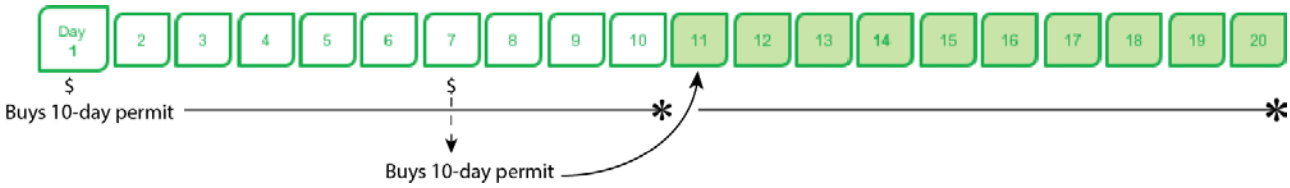
The state may wish to provide time permit holders the option to receive courtesy reminders about their time permit expiring. Three reminders may be helpful: one before the time permit expires; one on the day that the permit expires, and one on the day any established grace period ends and penalties begin to be assessed. *For purposes of the pilot, a possible approach would be to offer reminders by email and/or text message.*

With electronic time permits, additional time may be added to a current time permit:

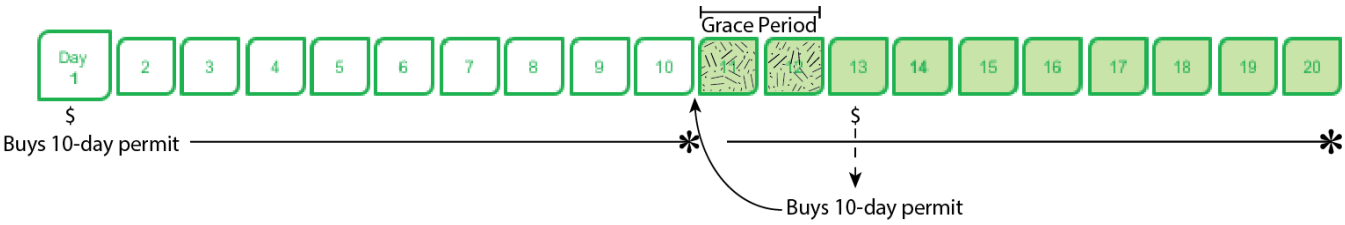
- Before it expires (the additional time simply extends the validity period); or,
- After the permit expires, but during a grace period, by retroactively paying for days for which no time permit was purchased (assuming that driving occurred on those days, or that continuously valid time permits are required).

For the purpose of the pilot, a 7-day “grace” period to simulate the lapsing and extension process should be considered. This would mean that the motorist has 7 days after the last day of the time permit to buy a new block. The new time permit will apply retroactively if purchased within this grace period.

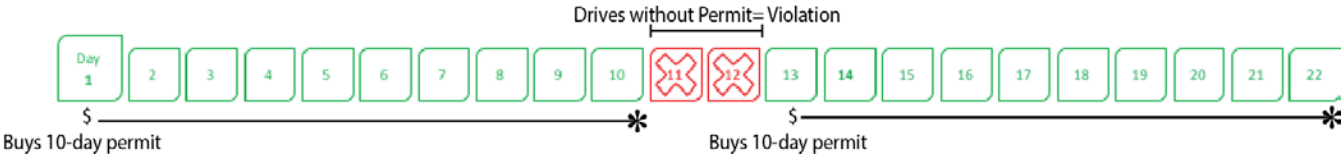
Example 1: Earl purchases a 10-day time permit and activates it on day 1. It is good for days 1-10. Even if he activates another 10-day time permit on day 7, the 10 days on the new permit add to the original 10 days on the current permit, so he has paid through day 20. This is illustrated in the figure below:



Example 2 (with grace period): Janet purchases a 10-day permit and activates it on day 1. It is good days 1-10. She drives on days 11 and 12 but does not activate another time permit until day 13. She is still within the proposed 7-day grace period, so the new permit first applies retroactively to any unpaid days (in this case, 2 days) and then extending to the expiration date of the permit. No violation exists. This example is illustrated in the figure below.



Example 3 (without grace period): Connie purchases a 10-day permit and activates it on day 1. It is good days 1-10. She drives on days 11 and 12 but does not activate another time permit until day 13, and no grace period exists. The new permit applies to days 13-22 and the motorist is in violation for days 11-12, since the vehicle was driven on a public roadway during these days. Even though the motorist eventually purchased additional time, she will receive a violation notice and potential penalty for the late purchase. Note that while this example did not include a grace period for illustrative purposes, grace periods are generally advantageous.



Enforcement on out-of-state motorists with time permits would be the same as enforcement on in-state motorists with time permits. To accommodate out-of-state vehicles, the road charging database would need to be designed to accept license plate numbers from other jurisdictions.

Violation Detection Procedures – Mileage Permit and Odometer Charges

Motorists selecting either the mileage permit or the odometer charge (pre-pay or post-pay) should be required to submit odometer readings on a periodic schedule. Some of these may be self-reported (unverified) odometer readings, while others may be required to be official (verified) odometer readings. In addition to submitting odometer readings on a periodic schedule, motorists will be required to submit odometer readings when switching to another operational concept.

A possible approach for implementing the odometer charge concept would be to require four odometer readings over the duration of the pilot: at the start of the pilot; at the 3- and 6- month marks; and at the end of the pilot would provide an adequate sample for this operational concept. Similarly, a possible approach for implementing the mileage permit concept would be to consider three odometer readings over the duration of the pilot: at the start, midpoint (between 4 or 5 months) and end of the pilot would provide an adequate sample for this operational concept.

Unofficial (or unverified) readings may be submitted by web, smartphone app, or mail. Verified readings will need to be taken by an authorized official. During the pilot, the authorized official may be any member of the pilot project staff, commercial account manager, or other organizations with which the pilot program enters into an agreement for odometer readings.

For the purposes of the pilot, it is proposed that motorists receive reminders one to two weeks prior to an odometer reading due date. When motorists do not submit an odometer reading by a certain due date, they will be committing an infraction. In addition, if an official/verified odometer reading reveals an unverified reading to have been incorrect, the motorist has committed an infraction, whether intentionally or unintentionally.

With the mileage permit concept, if any odometer reading, verified or unverified, reveals that the motorist did not purchase sufficient miles, the motorist has committed an infraction. *For the pilot, a possible approach would be to offer a 300-mile "grace" mileage, i.e., the motorist has 300 miles beyond the last mile on the mileage block to buy a new block. The new block of mileage will apply retroactively if purchased within this grace period.*

Enforcement on out-of-state vehicles is challenging for the odometer-based charges. Requiring an official odometer reading every time a visitor enters the state is impractical. In addition, for safety reasons, it is not recommended that police officers be requested to perform odometer readings in the course of traffic stops, both for in- and out-of-state motorists. Thus all odometer readings for out-of-state motorists would be unverified, which is a clear invitation for tax evasion.

Detecting Odometer Rollback

In an operational road charging system that includes odometer-based charges, a crucial element of enforcement would be detecting odometer rollback. However, checking for odometer rollback during the pilot is problematic for the following reasons:

- Odometer fraud is already illegal and a significant enforcement effort is in place. In federal law, odometer rollback is a felony. It is punishable by up to 3 years in prison, a substantial fine, or both. California DMV has an office dedicated to investigating odometer fraud.

- Because it is illegal, pilot participants, who are probably not individuals prone to evade the system, would be unlikely to engage in this behavior.
- Simulating certain types of infractions/violations for the pilot would itself be illegal.

Thus, checking for odometer rollback during the pilot is not suggested.

In an operational road charging system, the main method of detecting odometer rollback would be monitoring odometer records, including state records (from title transfers, emissions inspections, and verified odometer readings for the road charge), as well as odometer records from commercially-available vehicle history services such as CarFax (which collect odometer readings from other sources such as mechanic vehicle records). Note that all odometer records can include faulty data, so one odometer record indicating odometer rollback would not be a definite indicator—rather, it would indicate the need for an investigation.

It should also be noted that the financial motivation from evading a road charge to commit odometer fraud would be comparatively small—perhaps a few hundred dollars per year at most—while the existing penalties are very steep.

Finally, for as long as the fuel tax continues to be charged at the pump and issued as a credit against road charges, there is little financial motivation to commit odometer fraud. That is because the motorist will have already paid the fuel taxes. In order for the motorist to receive a credit for fuel taxes paid, he or she will have to declare the full mileage traveled, and thus pay the full road charges owed. Alternately, the motorist could roll back the odometer and only declare a small number of miles traveled, but would then not be credited for the fuels taxes already paid. When the fuel taxes are removed, this motivation will be eliminated, but by that time, fraud reduction mechanisms for the road charge may have matured to reduce or eliminate odometer fraud.

Violations Detection Procedures – Automated Distance Reporting

For both of the automated distance measurement operational concepts, a suggested approach for detecting possible violations during the pilot would be by reviewing electronic logs provided by those devices. The types of logs and possible violations vary by mileage meter technology, as follows:

- Onboard Diagnostics Port (OBDII)-based mileage meter: automated activity logs report instances of device removal and insertion (both time and duration), as well as various device failures, such as communications failures or Global Positioning System (GPS) failures (for those participants who opt for GPS). Occasional brief device removals are not suspicious (they are, for instance, necessary for taking the vehicle to the mechanic).
- Automaker vehicle telematics: automated activity logs may report various device failures, such as communications failures or GPS failures; however none of these failures are inherently linked to fraud. Very few types of fraud are possible with automaker telematics.
- Smartphone application: automated activity logs and database validation activities may identify instances of suspected driving without a phone in the vehicle; in addition,

periodic odometer images may be used to verify that no additional miles were driven without the phone in the vehicle.

- Commercial vehicle mileage meter: depending on the device, it may resemble the OBDII-based mileage meter; or it may resemble the automaker vehicle telematics mileage meter.

Out of state enforcement with these methods are the same as for in-state enforcement.

Violation Investigation

In the violations investigation stage, the enforcement group of the account management oversight investigates suspected violations to determine if the evidence supports an actual infraction.

Time Permit violations with electronically registered time permits would generally be clear-cut cases: if a time permit has expired and the established grace period has been exceeded, no further investigation is needed.

Mileage permit violations may also be clear-cut cases: if an odometer reading shows that insufficient mileage blocks have been purchased (including any grace mileage), then no further investigation may be needed.

For all cases based on self-reported odometer readings, if an odometer reading is lower than a previous odometer reading, then either the new or the previous reading must be incorrect; this is not necessarily an infraction, but a mistake that should be corrected, and the motorist should be notified immediately. If a given odometer reading is much higher than a previous reading, an error or infraction is possible. In such an instance, the motorist should be notified immediately. Potentially, an explanation could be requested of the motorist. However, only in cases of a very substantial change in odometer readings (>50,000 miles/year) is fraud likely. Fraud can also be detected by observing audit trails of odometer readings from public sources such as mechanic's records, which may be included in vehicle reports from services such as CarFax.

In general, motorists should be provided an opportunity to correct an erroneous odometer entry. Motorists should receive an "Are you sure?" message via mail / e-mail / text message when an illogical odometer reading is received by the account manager.

For automated distance reporting, the enforcement organization needs to investigate the issue directly, or the commercial account manager can investigate directly and report back to the enforcement organization. For the sake of the pilot, *one possible suggestion is to assign the account managers the responsibility to resolve minor issues and report all such issues to the Account Management Oversight* entity*. Such an approach could demonstrate the functionality of an account manager's role in resolving issues*. Problems with mileage meters that could lead to suspicious signals include the following:

- A broken OBDII port
- Physically broken recording/reporting device
- Intentional removal of the device from the vehicle

To investigate, the enforcement unit (of the account manager and/or Account Management Oversight entity) should compare the signals to similar cases in their files, which they will accumulate as the program grows, examine the mileage device, and also ask the motorist for an explanation of the issue.

Regardless of the roles ultimately assigned to the account manager and Account Management Oversight entity regarding enforcement, a clear set of standards that assign the proper level of evidence necessary to constitutes a violation will need to be developed. In an operational road charging system, audit trails of odometer readings (which may be included in vehicle reports from services such as CarFax) can also be used to check for fraud.

Appendix 11: Summary of Written and Public Comments Received

The table below summarizes comments received from stakeholder groups including non-profit organizations, community groups, and local and regional governments.

No.	Comment received	Background Information[23]
1.	Sierra Club announced their interest in participating in the public process. Noted that they will submit formal comments in the future	Sierra Club email to TAC dated Jan 22. Asked to be added to stakeholder list. Darrell Clarke, Sierra Club Beyond Oil Campaign national co-lead. darrell.clarke@sierraclub.org
2.	Letter titled, "Comments on the Design of a RUC Pilot Program" in which includes support of the Road Charge and a request for the environmental community to be well represented on the TAC.	Letter from Ken Clarence (President, Democratic Club of Carlsbad-Oceanside) to all TAC members dated Mar 27.
3.	Letter titled, "Road Charge Compliance and Collection Issues" which indicates that California must consider a number of transitional issues while discussing the framework for such a program. Key issues outlined include: Tax Collection and Administration, Tax Compliance, Double Taxation, Taxpayer Protection, Out-of-State Motorists: Who Pays the Tax?	Letter from Robert Gutierrez (Director, CalTax) to the TAC dated Apr 22.
4.	Letter to Jim Madaffer and the TAC outlines a series of issues that the Transportation Agency recommends consideration including funding stability, equity in implementation, system flexibility, existing formulas, flexible dollars, and regional coordination.	Letter from Debra Hale (Executive Director, Transportation Agency for Monterrey County) to the TAC dated Apr 24.
5.	Request to have a TAC meeting in the North State Area	Email from Devon Jones (Executive Director Mendocino County Farm Bureau) dated May 8.
6.	David Davis has been a 7-passenger vanpool operator for over 18 years. Offer to provide detail on vanpools in terms of data on costs, average ridership, alternates riders, etc.	Email form David Davis (Supervising Tax Auditor, ADRS – Allocation Group and Summary Unit State Board of Equalization) dated May 12.
7.	Letter titled, "Considerations Related to the Business Case for Road Charging" starts out by extending gratitude for opportunity to be a member of the Road Charge Working Group. Letter encourages the Advisory Committee to give some thought as to how "private" roads might be exempted from the road user charge.	Letter from Silvio Ferrari (Vice President of Legislative Affairs, California Building Industry Association) dated May 26.
8.	Letter titled, "CalTax Comments for TAC's May 29th Meeting" which outlines concerns for several issues: Pilot Project Participants and Exemptions, Privacy Protection and Elements of Utility Metering and Billing Systems.	Letter from Robert Gutierrez (Director, CalTax) to the TAC dated Apr 22.
9.	Email indicates attendance at the May 29 TAC meeting and lists a number of questions to be	Email from Tricia Stever Blattler (Executive Director, Tulare County Farm Bureau) dated May 26.

[23] Vital statistics about the comment: Who made the comment, when they made it and how they made it (email, letter, etc.).

No.	Comment received	Background Information[23]
	posed related to "agriculture needs to be represented in the discussions.	
10.	Letter titled, "Opposition to ZEV Exemption" expresses concern about SHCC is concerned about recent suggestions to exempt ZEVs from a future Road Charge program.	Letter from Keith N. Dunn (Executive Director, SELF HELP COUNTY COALITION)
11.	Letter titled, "Research data and needs to understand potential equity impacts of a Road Usage Charge" which lists several comments related to TransForm's position concerning equity impacts.	Letter from Joshua Stark (State Policy Director, TransForm) dated
12.	Letter presenting the position that future efforts to resolve our transportation funding challenges should be accompanied by actions to repay past loans, and/or restore redirected gas tax revenues back to transportation.	Letter from Darrell Johnson (CEO, OCTA) dated June 15.
13.	Letter expressed gratitude for a presentation by Jim Madaffer to their group and that they look forward to developing a letter to the TAC on issues that came up.	Letter from Deborah Barmack (President, Inland Action) dated July 28.
14.	Letter titled, "California Road User Charge (RUC) Pilot Program – Advocating Rural Interest which asks for consideration of rural equity issues including study the driving efficiency of highway versus city MPG: study specific to California on the impacts of rural, urban and mixed counties; reconsider a vehicle hourly tax; and consider a rural forum.	Letter co-signed by John Gomes (Chair, Calaveras Council of Governments) and Melissa Eads (Executive Director, Calaveras Council of Governments) dated August 5.
15.	Letter titled, "Design of a Road Usage Charge (RUC) Pilot Program" expressing gratitude for the excellent presentation by Jim Madaffer to the Sierra Club and expresses that they ideal plan for a road user charge would protect privacy; maintain a strong per-mile price incentive to drive energy-efficient cars; accommodate low-income users; permit a per-mile insurance fee; and permit congestion pricing. The letter also indicates that an ideal plan should internalize external costs associated with road use, including environmental and health costs; ensure that revenues generated are applied to improve public transportation and increase fleet efficiency.	Letter from Steve Birdlebough (Volunteer Chair, Sierra Club California Transportation Committee) and Kathryn Phillips (Executive Director, Sierra Club California) dated September 1.
16.	Letter (untitled) recommends consideration of providing a payment method similar to the Even Pay program by Pacific Power.	Letter from Tamera Leighton (Executive Director, Del Norte Local Transportation Commission) – undated

No.	Comment received	Background Information[23]
17.	Letter to Jim Madaffer and Members of the Committee informing them that the CRTP is a new organization with several comments: support for responsible revenue raising for maintaining the existing infrastructure, expressed reservations about the road charge concept due to potential to unfairly penalize people in rural areas, need to scale back the building of new infrastructure in order to focus on repair and maintenance of existing infrastructure, and building of new infrastructure should support alternative modes of transportation such as walking bicycling and public transit.	Letter form Barbara Kennedy (Spokesperson, Coalition for Responsible Transportation Priorities, CRTP) dated September 16.

In addition, 92 emails and letters from members of the general public were received. Of these, 9 expressed general support for concept of road charging, 17 expressed opposition, and the remaining 67 did not express a position. The contributions covered a wide range of topics, including the following:

- 40 discussed, posed questions about, and/or suggested methods of road charge collection.
- 20 discussed and/or suggested policy or operational approaches to dealing with gasoline taxes
- 10 discussed and/or suggested types of vehicles to include in the pilot
- 9 addressed the issue of how to address out-of-state drivers in a road charging system
- 8 addressed equity issues of road charging
- 6 addressed privacy issues related to road charging
- Other topics addressed included rural driving, environmental issues, costs of road charge collection, exemptions, billing and collection issues, research topics and public outreach.

Glossary

Term/Abbreviation	Definition/Description	Remarks
AAA	American Automobile Association	Refers collectively to both Automobile Club of Southern California, and Automobile Club of North California, Nevada and Utah
AMO	Account Management Oversight	
CAFÉ	Corporate Average Fuel Economy	
CalSTA	California State Transportation Agency	
CalTAX	California Tax Payers Association	
Caltrans	California Department of Transportation	
CAM	Commercial Account Manager	
CARB	California Air Resources Board	
ConOps	Concept of Operations	
CSR	Customer Service Representative	
CTC	California Transportation Commission	
CTIP	California Transportation Infrastructure Priorities	
DMV	Department of Motor Vehicles	
Energy Information Administration	U.S. Energy Information Administration	
EPA	Environmental Protection Agency	
GPS	Global Positioning System	
GVWR	Gross Vehicle Weight Rating	
HCD	California Department of Housing and Community Development	
IFTA	International Fuel Tax Agreement	
IT	Information Technology	
MM	Mileage Metering Device	
mpg or mpge	Miles Per Gallon or Miles Per Gallon Equivalent	mpge is used in lieu of mpg for vehicles that derive some or all motive power from a fuel source other than gasoline or diesel, such as electricity.
MRD	Mileage Reporting Device	
OC	Operational Concept	
RUC	Road Use Charge or Road Usage Charging	
SANBAG	San Bernardino Association of Governments	

SB	Senate Bill
TAC	California Road Charge Technical Advisory Committee
UBI	Usage-Based Insurance
UMTRI	Michigan Transportation Research Institute
VIN	Vehicle Identification Number