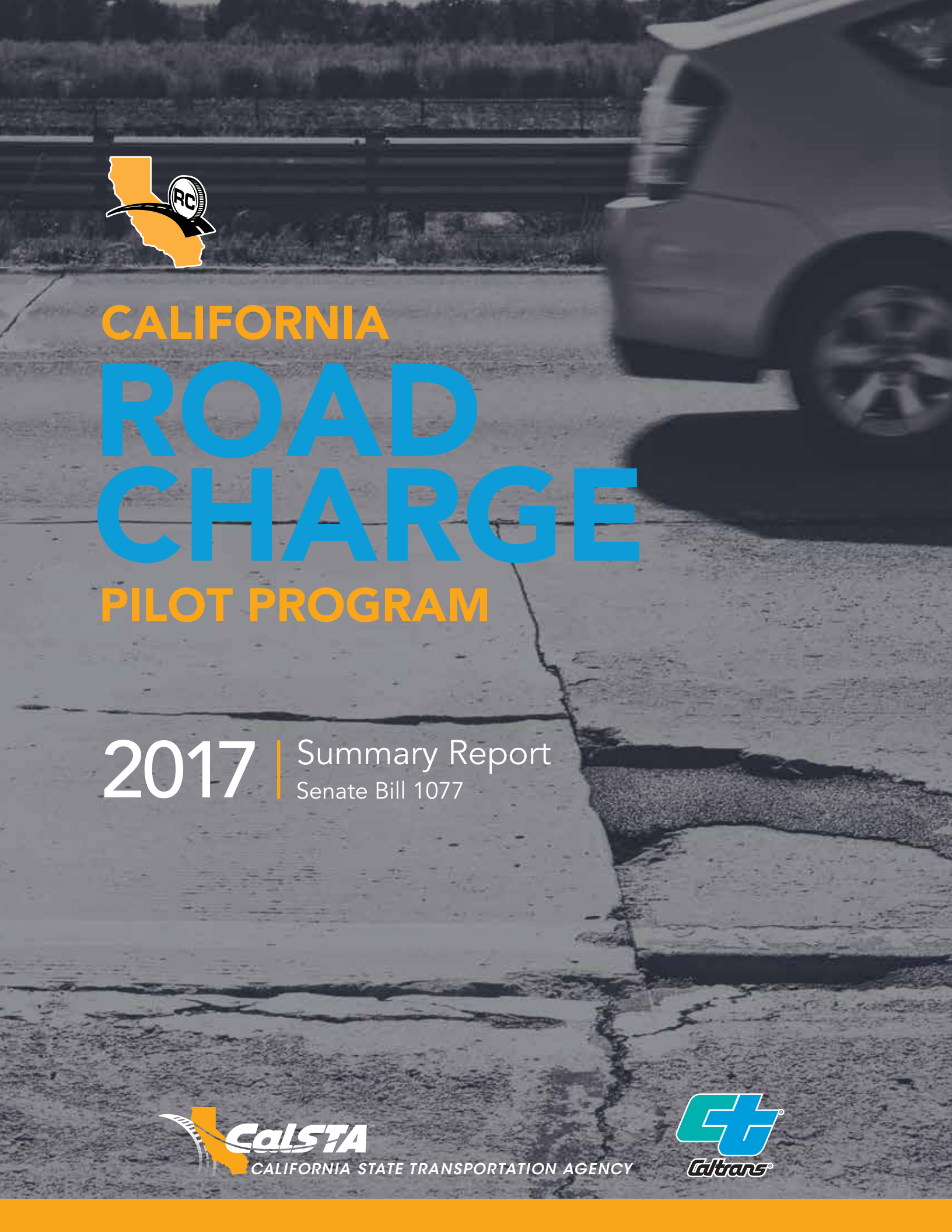

CALIFORNIA ROAD CHARGE PILOT PROGRAM

2017 | Summary Report

Senate Bill 1077

CalSTA
CALIFORNIA STATE TRANSPORTATION AGENCY

Caltrans

ACKNOWLEDGEMENT

The California State Transportation Agency would like to thank the following partners for their commitment and continued collaboration on the California Road Charge Pilot Program:

The California Department of Transportation
The California Transportation Commission
The Road Charge Technical Advisory Committee

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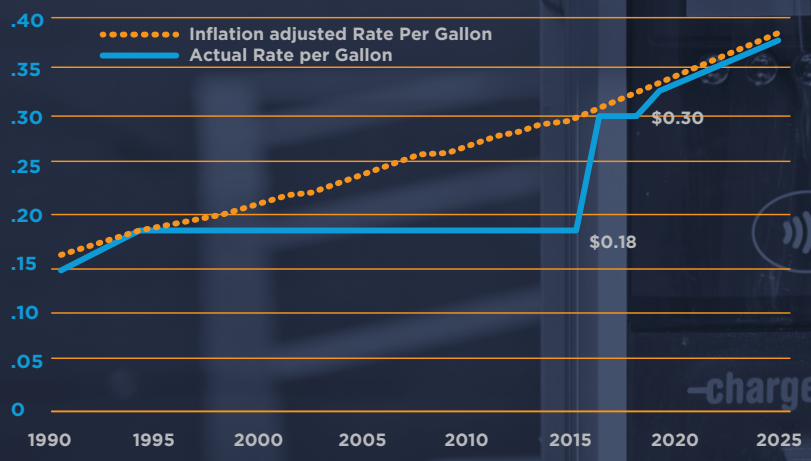
Introduction

Nearly all of the 350 billion miles driven each year on California's highways and roads are powered by gasoline or diesel fueled vehicles. Historically, the taxes on those fuels provided the majority of the revenue required to maintain and operate our transportation network. As future consumption of gasoline and diesel fuel declines, due to increased fleet efficiency, California will be challenged to sustain its $2.5 trillion economy. Continuing to depend on a consumption based transportation model, while at the same time adopting policies to increase vehicle fuel efficiency and promote the reduction of vehicle miles traveled, puts into question the long-term viability of the gas tax as a sustainable revenue model.

Historically, transportation funding has been impacted by two main factors: inflation and vehicle fuel efficiency. Until this year, with the passage of the Road Repair and Accountability Act of 2017 (Senate Bill 1), the state gas tax had not been adjusted for inflation since 1994, which significantly reduced its purchasing power. Senate Bill 1 adjusted fuel rates for past inflation and includes future inflation adjustments, solving the inflation issue and delaying the expected transportation funding shortage by a decade or more. However, the impact of improving vehicle fuel efficiency remains an issue, especially as new vehicles sold in the coming decades are expected to be much more fuel efficient.

Figure 1 – Senate Bill 1 Gas Tax Stabilization



Source: Department of Finance

Without Senate Bill 1's inflation adjustments, the transportation funding shortfall would be quickly approaching. The new Senate Bill 1 revenues, as illustrated in Figure 1, stabilize the state's short-term transportation infrastructure funding needs and provides time to explore alternatives to continued reliance on fuel taxes.

Senate Bill 1 took important steps to address the fuel efficiency issue with the inclusion of a new transportation revenue stream from vehicle registration, including electric vehicles, which diversifies the funding for transportation, and at the margin, makes transportation investments less dependent on fuel taxes. However, the majority of revenue will still be derived from the consumption of fossil fuels.

In response to the 1973-74 Arab Oil Embargo, the United States Congress enacted the Corporate Average Fuel Economy (CAFE) Standards in 1975, with the goal of reducing oil consumption by increasing the fuel economy of cars and light trucks, as seen in Figure 2. Throughout the 1980s and 90s, the pressure to reduce fuel consumption lessened due to increased production and inventory of fuel, driving down the cost to the consumer. However, with gas prices reaching in excess of $4.00 per gallon in 2008, renewed interest in the CAFE standards, and the desire to reduce greenhouse gas emissions prompted President Obama to propose a new national fuel economy program which adopted uniform federal standards to regulate both fuel economy and greenhouse gas emissions.

Additional anecdotal data supporting this phenomenon, based on national data collected by the U.S. Department of Energy, illustrates that the relationship between fuel economy and consumption is not linear. Figure 3 further illustrates fuel economy improvements in vehicles with lower miles per gallon ratings (suburban/truck) have a greater impact on reducing fuel consumption than improvements to vehicles with higher miles

Figure 2 – As Fuel Economy Increases, Fuel Consumption Declines

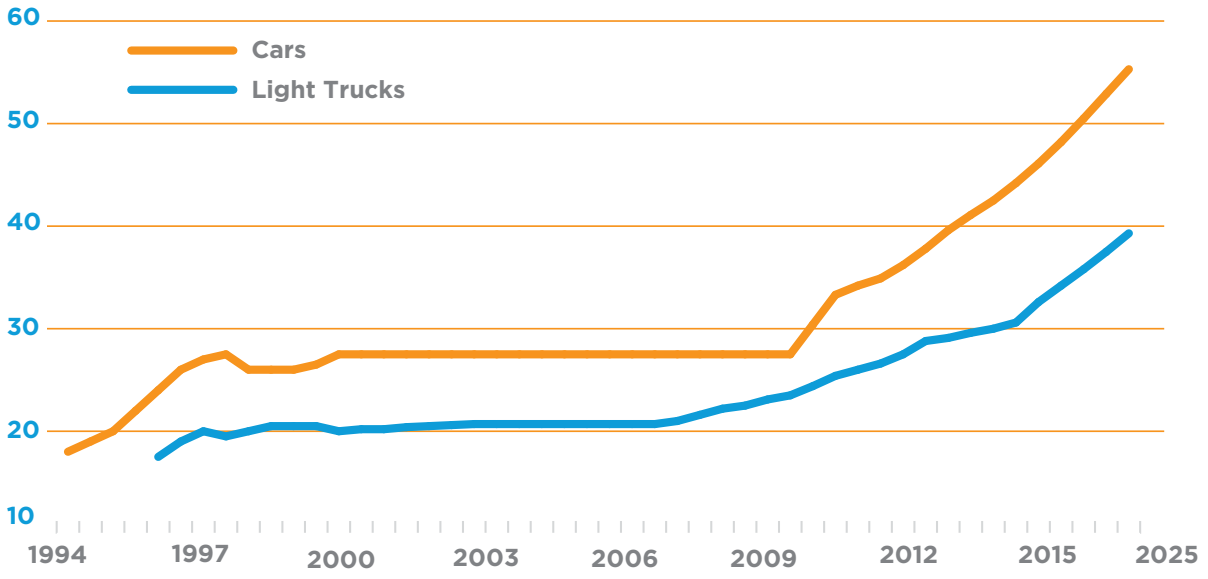
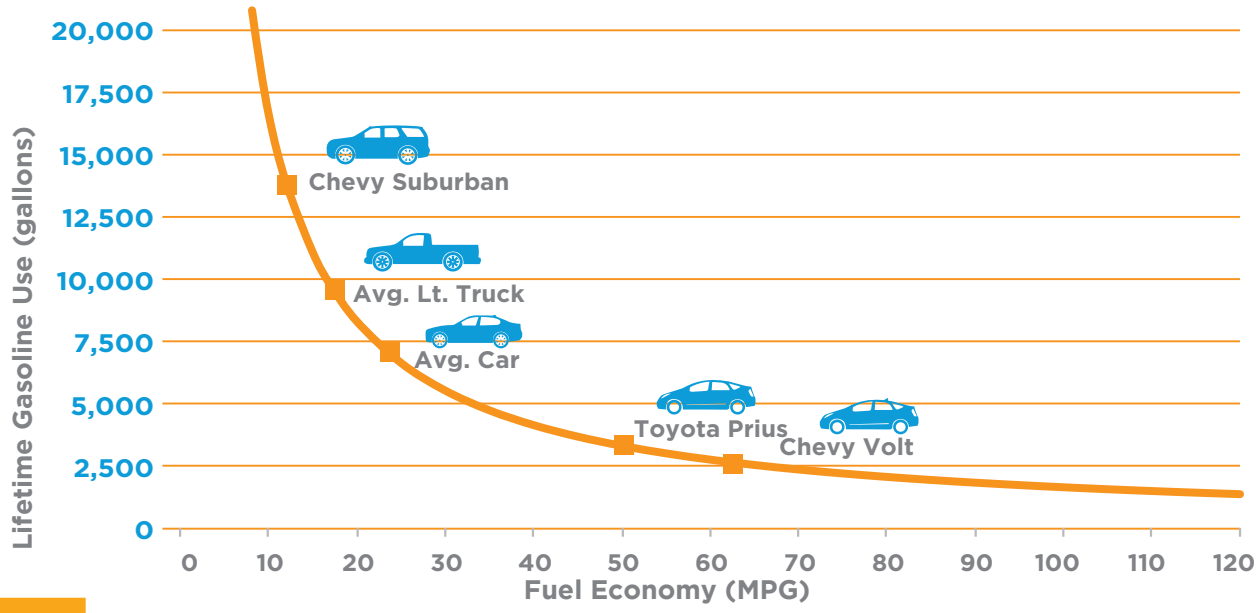


Figure 3 – Increasing Vehicle Fuel Efficiency



per gallon ratings (hybrids). This is because increasing fuel economy by percentage has a greater impact than the numerical increase of fuel economy (miles per gallon). For instance, an increase in the miles per gallon from 10 to 12 mpg represents a 20 percent improvement in fuel economy, while increasing the same 2 miles per gallon from 20 to 22 is only a 10 percent improvement. In other words, if a driver trades in their average light duty truck for an average passenger car, they save over four times (4X) as much fuel as a driver that switches from a plug-in electric vehicle to a fully electric vehicle.

To advance the integration of fuel efficient vehicles into the fleet, California has adopted measures that enhance the vehicle fleet efficiency in an effort to reduce greenhouse gas (GHG) emissions. In 2012, Governor Brown issued Executive Order (B-16-2012) establishing the goal of the California fleet consisting of a minimum of 1.5 million zero-emission vehicles (ZEVs) by 2025.

Similarly, in 2016, Governor Brown issued Executive Order (B-30-15), and signed Senate Bill 32 mandating a 40 percent reduction in California's GHG emissions by 2030. The California Air Resources Board (ARB), in response to Senate Bill 32, drafted "The 2017 Climate Change Scoping Plan Update - The Proposed Strategy for Achieving California's 2030 Greenhouse Gas Target" to further define the efforts needed to reach the 2030 GHG target. Included in ARB's Scoping Plan is a call for 4.2 million ZEVs on California roads by 2030. To add to the adoption of alternative fuel vehicles, in 2015 Governor Brown recognized the necessity for cars and

trucks to reduce gas consumption by 50 percent by 2030.

Policies promoting fuel efficiency are clearly beneficial for California's environment and for its efforts to combat climate change. However, measures to achieve these goals will adversely impact the revenues collected for transportation infrastructure based on the current gas tax model. In the long-term, California cannot rely primarily on the gas tax to fund the maintenance and operations of our vital transportation system, which directly impacts the overall quality of life for Californians.

Acknowledging the long term viability of the gas tax, the California Legislature and Governor Brown demonstrated the foresight to investigate a sustainable transportation funding mechanism, known as a road charge, with the passage of Senate Bill 1077 (Statutes of 2014, DeSaulnier). The legislation directed the Chair of the California Transportation Commission (CTC), in collaboration with the Secretary of the California State Transportation Agency (CalSTA), to create a Road Charge Technical Advisory Committee (TAC) to study road charge as an alternative to the gas tax.

Senate Bill 1077 provided general policy direction and design parameters to guide the TAC's investigation, deliberation and recommendations in the design of a pilot to test the road charge concept in California. In December 2015, the TAC delivered their Road Charge Pilot Design Recommendations Report to CalSTA for implementation.

Building off of the TAC's recommendations, CalSTA, with the assistance of the Department of Transportation (Caltrans), used the following four overarching principles in the preparation, implementation, and assessment of the Road Charge Pilot Program:

- **Feasibility –** the viability of recording and reporting of vehicle miles traveled for a statewide road charge system
- **Complexity –** the degree of difficulty of implementing a statewide road charge system
- **Security –** ensuring the safeguarding of personally identifiable information and data in a statewide road charge system
- **Acceptability –** surveying the acceptability of a road charge as an alternative to the gas tax

Working under the direction of CalSTA, Caltrans was tasked with the development, deployment, and evaluation of the Road Charge Pilot Program.

The remaining sections of this document focuses on the California Road Charge Pilot Program development, implementation, findings and next steps.

1. California Road Charge Pilot Program

With policy direction established by the Legislature, and pilot design parameters prescribed by the TAC, Caltrans, working under the direction of CalSTA, advanced and implemented the Road Charge Pilot Program.

In preparation for the road charge pilot launch in July 2016, Caltrans began preliminary pilot program development in late 2015, as the TAC was completing its recommendations. Pursuant to the TAC recommendations, the Road Charge Pilot Program sought to recruit and retain 5,000 volunteer vehicles, report miles traveled, pay mock road charges, and provide valuable feedback on the overall pilot program.

Vehicles enlisted in the pilot came from every segment of California's driving population, including a wide range of passenger vehicles, agency and business fleets, and for the first time, commercial trucking. In order to collect a large and valid set of perspectives, the pilot sought comprehensive representation of California's diverse demographic, geographic and socioeconomic population, including, participants from various communities (rural/agricultural and urban/suburban), income levels, races and ethnicities, gender, and age groups throughout the state.

In order to reach the 5,000 vehicle target in the pilot, Caltrans invited volunteers from a volunteer pool representing over 10,000 vehicles to enroll into the pilot. The statewide recruitment effort included in-person presentations at civic, community, and stakeholder meetings around the state, flyers placed in the Department of Motor Vehicle (DMV) registration renewal sticker distribution, ongoing monthly newsletters, public service announcements (in English and Spanish), and social media advertisements. A dedicated website (www.CaliforniaRoadChargePilot.com) was one of the most effective tools for encouraging volunteer sign-ups, disseminating pilot information to participants, communicating to the general public, and providing a central place to accept any public questions or feedback.

TAC Participant Targets

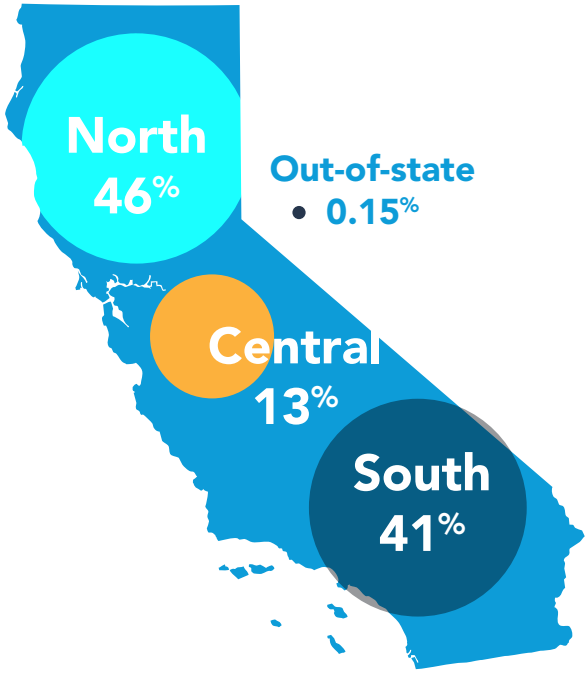
Commercial Vehicles (Businesses)		North	Central	South	Trucks
		100	50	175	50
Private Vehicles (Individuals & Households)					Other
Urban & Suburban	$	475	175	1050	
	$$	475	175	1050	
Rural & Agriculture	$	200	200	150	125
	$$	200	200	150	

To ensure the pilot represented the diverse demographic, geographic and socio-economic aspects to the state, the participant recruitment process was designed to:

- Encourage maximum enrollment of targeted groups; and
- Prioritize volunteers who provided demographic information

In June 2016, volunteers were invited to become pilot participants, providing ample time to complete the conversion process from volunteer to participant. The conversion process included selecting an account manager, choosing a mileage reporting method, and setting up an online account. An interactive decision tree on www.CaliforniaRoadChargePilot.com provided side-by-side comparisons of the options available and provided a direct link to account manager web portals, where participants established their online accounts.

Pilot Participant Breakdown by Region



1.1 ACCOUNT MANAGEMENT

Fulfilling the recommendation of the TAC to offer drivers a choice in account managers in the deployment of the Road Charge Pilot Program, Commercial Account Managers (CAM)s were employed to manage pilot participant accounts, collect mileage traveled data, generate and issue simulated invoices,

and manage receipt of mock payments. Additionally, a state account manager (CalSAM) was utilized to simulate a state run road charge function.

The use of third-party vendors is not an entirely foreign concept for California. For example, the California Department of Motor Vehicles (DMV) established a Business Partner Automation Program[2] that allows qualified industry businesses to process over 20 different vehicle related transactions on their behalf.

Rather than become constrained by proprietary technology, that would limit options for future implementation, the pilot program tested an *open system,* which fosters technological innovation and efficiencies in operations, and encourages competitive pricing, making road charge an effective revenue collection process.

From the perspective of the state and the participants, road charge account management proved no different from any other online retail or utility account services. The CAMs and the CalSAM featured a secure web portal to display information, such as road charges and payments. The CAMs also provided value-added services to some participants, such as smartphone apps, trip logs, vehicle health and battery monitoring, driver safety scores, and carbon emissions.

1.2 MILEAGE REPORTING METHODS AND DATA COLLECTION

Fundamental to establishing a road charge, each driver reported the amount of road usage (or miles traveled) over a designated period. The pilot program offered a range of reporting options, from no technology (did not require reporting any personal information) to high-technology (with or without location-based services). These reporting options were classified into two main categories: manual and automated, with additional technology choices for automated methods.

Manual reporting methods:

- ***Time Permit.*** A reporting method in which the participant pre-pays for an unlimited amount of driving for a fixed time period.

- ***Mileage Permit.*** A reporting method in which the vehicle owner pre-pays for a fixed number of miles.

- ***Odometer Charge.*** A reporting method in which a driver reports miles driven periodically and post-pays for the number of miles traveled since the last odometer reporting.

Automated reporting methods:

- ***Automated Reporting with No Location.*** Allowed participants, to utilize a technology options without the location-determination technology, such as GPS.
- ***Automated Reporting with General Location.*** Allowed participants to avoid paying the road charge for non-chargeable travel, such as driving out-of-state, or on private roads. These methods contain location-determination technology, but only report general location through a process known as map matching, which deletes precise location information once the system can accurately categorize travel as chargeable or non-chargeable.

1.3 REPORTING TECHNOLOGIES

As mentioned earlier, the automated methods of reporting offered a ***variety of reporting***

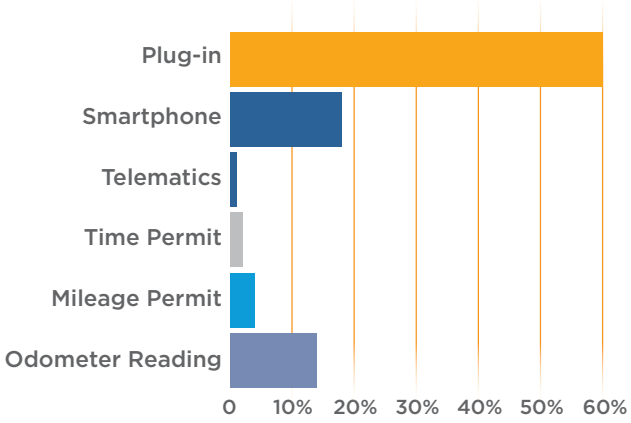
[2]*https://www.dmv.ca.gov/portal/dmv/?1dmy&urile=wcm:path:/dmv_content_en/dmv/otherser/bpa/bpa*

technologies. Options recommended by the TAC for testing included: on-board diagnostic (OBD-II) plug-in devices with and without location services, smartphone apps with and without location awareness, in-vehicle telematics (with measurement and reporting technology built into the vehicle), and electronic logging devices specially designed for heavy commercial trucks.

Plug-in Device. Is an electronic device that plugs into a vehicle's data port, more formally known as the on-board diagnostics (OBD-II) port. It then uses wireless technology to transmit mileage information to the Account Manager. Such plug-in devices often offer a range of additional functions to the driver called value-added services, such as keeping a log of trips taken.

Smartphone with No Location. The pilot deployed a smartphone application which measures mileage through vehicle odometer images drivers submit once a month, which included a range of security features that make fraud attempts easily detected.

Pilot Breakdown of Reporting Methods



Smartphone with General Location. Is an application that measures mileage through a proprietary algorithm that determines when a driver is driving in his/her vehicle using available data (GPS location data, Wi-Fi signals, and other data), using the location data to measure miles driven. As a backup to this algorithm, the pilot required participants to submit odometer images once a month within the smartphone application.

In-vehicle Telematics. Consists of technology integrated into vehicles.This option allows the transmission of a range of vehicle data to an internet-based system operated by the carmaker, such as Ford's Sync or GM's OnStar.

Commercial Vehicle Mileage Meter. Is a device that is professionally mounted into commercial trucks to measure distance traveled for the purposes of paying a road charge. Such devices offer a range of services to the operators of commercial vehicle fleets, such as fleet monitoring.

1.4 PRIVACY PROTECTION

Building on SB 1077 privacy requirements, the TAC developed additional privacy provisions when developing their design recommendations. Specifically, the TAC

80% of vehicles used automated mileage reporting methods at the conclusion of the pilot.

identified three different approaches for protecting privacy: governance, accountability, and model protection provisions.

- The **Governance Approach** is a holistic 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, close-out and reporting of pilot program activities.
- The **Accountability Approach** called for an Independent Evaluator to evaluate the road charge pilot program's performance against a set of specific privacy protection criteria, similar to a performance audit.
- 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.

For deployment of the pilot program, all of the privacy recommendations provided by the TAC were incorporated into a Road Charge Privacy Policy document, which was shared with all of the volunteers in advance of enrollment. The Road Charge Privacy Policy makes it clear that participant demographic information would only be used for pilot purposes, helping policymakers better understand how a road charge might affect groups in distinct ways, depending on where they live, their general income level, the number of people in their household, and other factors.

1.5 DATA SECURITY

In this digital age, Californians expect their data will be secure, especially in a government program. Yet maintaining the security of personally identifiable information and data continues to be a challenge. Maintaining security of systems to protect personal data and information requires the design and management of data security according to international best practices. The pilot adopted specific data security measures based on industry standards for online financial-grade transactions, including authentication and authorization for data access, notification of data modification, data masking, encryption and storage, data transmittal, ISO requirements for network security, and data destruction.

To provide an added level of assurance to participants, the TAC recommended a third party expert complete a security verification of all entities involved in data collection for the pilot. This independent security verification ensured that account managers and mileage reporting vendors had secure systems, reducing the likelihood of any data compromises.

1.6 ENFORCEMENT AND COMPLIANCE

As a strictly voluntary program, with no money changing hands, there was minimal benefit to engage in rigorous enforcement and compliance activities for the pilot program. However, any system that includes actual collection of revenue and millions of users will undoubtedly need to define and develop

enforcement and compliance measures prior to implementation.

While the TAC identified stages of enforcement in their report, they recommended not testing it in the pilot, rather focusing on anomalies in mileage data. Compliance activities therefore consisted of direct communications from account managers to non-compliant participants to encourage both initial and ongoing compliance.

1.7 PARTICIPANT EXPERIENCE

Once enrolled in the pilot, having selected an account manager, mileage reporting method and technology, the participants began driving. Account managers collected mileage and fuel consumption via secure wireless communications for the automated methods, and periodic readings for manual options. Monthly simulated invoices were generated based on the reported miles driven providing a comparison of the estimated gas tax paid and what would have been paid in a road charge system (Figure 4). Thereafter, each participant submitted a mock road charge payment via an on-line wallet.

1.8 INDEPENDENT EVALUATION

Pursuant to the TAC recommendations, a third-party Independent Evaluator was hired to assess the pilot performance based on criteria developed by the TAC. The Independent Evaluator was tasked with measuring the data collected during the pilot, and more importantly, collecting attitudinal and experiential information from the pilot participants.

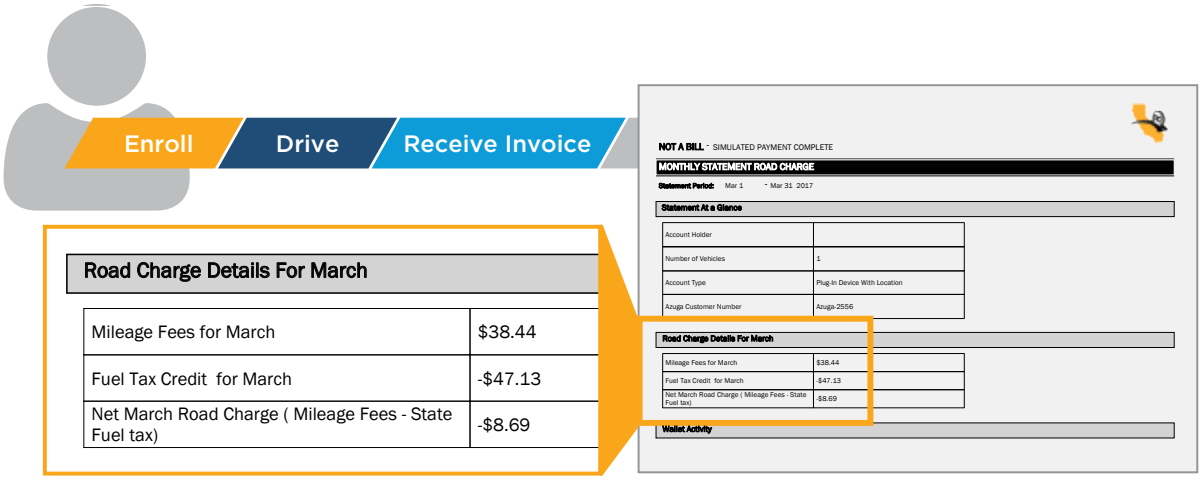
To measure the pilot participants experience, the Independent Evaluator invited all participants to complete at least three surveys: at the beginning, mid-point, and

86% satisfied with mileage reporting method

74% satisfied with account manager chosen for the pilot

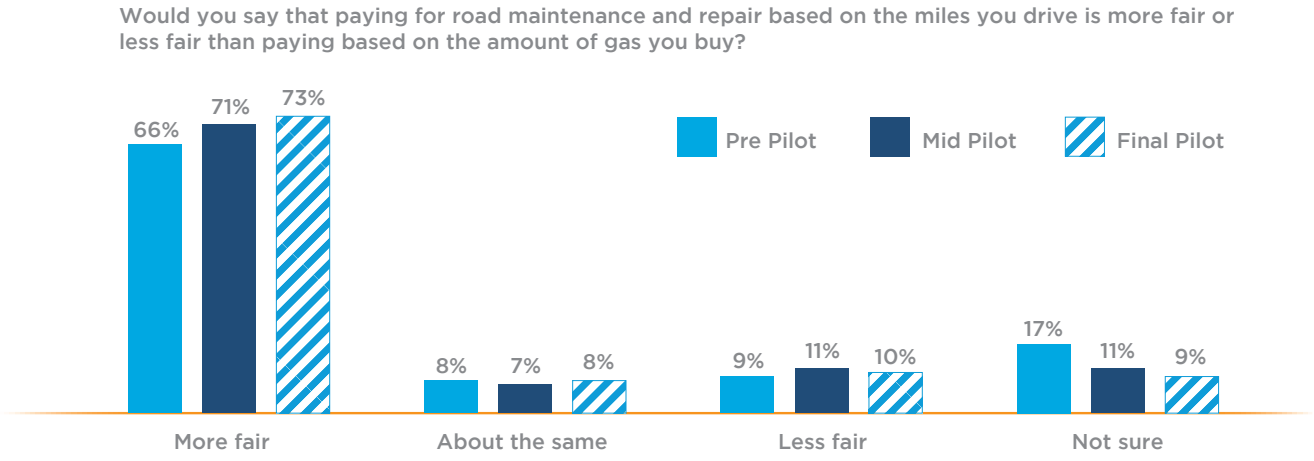
62% using technology chose a location-based mileage reporting method

Figure 4 – Participant Experience



end of the pilot. Overall, surveys revealed high levels of participant satisfaction, and an increased understanding of road charge from the beginning to the end of the pilot. At the conclusion of the pilot, five focus groups were conducted throughout the state. These focus group conversations were employed to investigate the complexity and depth of opinions around the pilot program and elicit responses that would not have otherwise been available as part of the data research and surveys.

Participant Views of Road Charge Fairness



73% felt a road charge was a more equitable transportation funding solution than the gas tax

87% found participating in the pilot easy

85% overall pilot satisfaction, which is further supported by the low rate of 4% attrition

61% are more aware of the amount they pay for road maintenance

2. California Road Charge Pilot Observations

The Road Charge Pilot participants drove in excess of 37 million miles during the nine month pilot period, demonstrating the desire for mobility. It also is a testament to California's commitment to being a leader in innovation, having achieved many firsts during the pilot:

- Maintaining over 5,000 participating vehicles over a nine-month pilot
- Demonstrating six reporting and recording methods
- Offering various technology options, including no technology and high-technology options; and
- Including, for the first time, heavy commercial vehicles

In keeping with the four overarching pilot principles: feasibility, complexity, security and acceptability, the following are observations made during the development, implementation, and evaluation of the Road Charge Pilot Program:

2.1 PILOT PARTICIPATION

The Road Charge Pilot Program represented vehicles from every segment of California's driving population, including a wide range of passenger vehicles, agency and business fleets, household vehicles, and commercial trucking. In order to collect a large and valid set of perspectives, the pilot sought comprehensive representation of California's diverse demographic, geographic and socioeconomic population, including participants from various communities (rural/agricultural and urban/suburban), income levels, races and ethnicities, genders, and age groups throughout the state.

Observation: Certain demographic targets and sub-targets set by the TAC were unattainable. This was due in large part to the truncated pilot delivery schedule, as well as limited resources for pilot recruitment. The most difficult targets to convert from volunteer to participant were rural, low-income, and certain ethnicities/races. In an operational system, where all vehicles are participating, this issue will be mute.

2.2 THIRD PARTY VENDORS

The Road Charge Pilot Program was successful in studying the viability of utilizing third-party vendors (account managers), to provide the necessary services and technologies used to record and report miles driven.

Observation: Account managers provided the flexibility of services to pilot participants, and demonstrated the ability to offer other value-added features, thus enhancing the user experience. However, the state did not contract directly with the vendors during the pilot, reducing the risk to the state, but at the same time reducing the state's ability to ensure performance goals were met.

2.3 MILEAGE REPORTING METHODS

Pilot participants had a variety of manual and automated mileage reporting and recording methods to select from based on their unique needs and interests.

Observation: Offering a multitude of choices caused a level of concern from the participants. In particular, the clarity of communications and instructions regarding the mileage reporting methods and technology options available during enrollment. Nevertheless, at the conclusion of the pilot the majority of the participants were happy with the method they chose.

2.4 PRIVACY AND DATA SECURITY

As stated earlier, privacy and data security were paramount to the Legislature, CalSTA, the TAC, and Caltrans. Incorporation of the TAC recommended privacy and data security provisions assured pilot participants that the information and data they provided for the pilot was secure.

Observation: There were no data breaches or data security concerns throughout the duration of the pilot.However, the importance of data security should not be discounted and any future systems should strive to exceed standard security practices.

Based on participant feedback there was an overall 78 percent satisfaction rating in regards to the pilot privacy and data security. At face value, survey satisfaction rating could indicate that privacy and data security were not as critical as first assumed. However, due to the small sample size, compared to the overall state driving population, and the fact that the pilot participants are more likely early adopters, it is difficult to rely on these results to reflect perceptions of all California motorists.

2.5 PARTICIPANT PERCEPTIONS

Overall participant satisfaction was favorable with an overall approval rating of 85 percent, which is further supported by the low dropout rate of 4 percent.

Observation: Some of the high-level survey results indicate that participants felt a road charge is a more equitable transportation funding solution than the current gas tax, but additional research is needed before implementation. Additionally, over 90 percent of the participants expressed willingness to participate in future road charge demonstrations.

2.6 PER-MILE RATE

For purposes of evaluating the effectiveness of a road charge, the TAC recommended establishing a revenue neutral rate to simulate a road charge. Given that direction, a rate was established prior to the deployment of

the pilot, taking the five-year average of the gas tax (base and price-based excise) and dividing by the average miles per gallon of the entire California fleet. As a result, the rate used for the pilot was set at 1.8 cents per mile.

Observation: While this rate reflects a revenue-neutral rate based on the California fleet average. When compared to the sample of vehicles participating in the pilot, the simulated road charge rate was not revenue neutral. This was due to the pilot sample fleet having an average miles per gallon higher than the statewide average. At the time of the rate setting exercise, there was no way to predict what composition of vehicles would actually participate in the pilot.

2.7 ENFORCEMENT AND COMPLIANCE

From an operational perspective, the elements tested were successful. The pilot was able to test and audit the operational systems and requirements of the program.

Observation: The inability to adequately test the compliance and enforcement aspect of a road charge provides a level of uncertainty on the methodologies to employ, and the overall cost to enforce. Due to this program being volunteer based, and the fact that no revenue was collected, there is no measure of compliance to be extrapolated for a statewide program. The testing of enforcement and compliance is critical to reasonably estimate the administrative costs of a road charge program.

2.8 TECHNOLOGY

All the mileage reporting options tested worked to some degree.

Observation: The manual options provided the highest degree of privacy and data security, but will in all likelihood be the most difficult to enforce, and in some cases, such as the odometer reading, could be costly to administer. Of the automated methods, the plug-in (OBD II) devices are the most reliable options. However, as new technology emerges, this methodology could be obsolete by the time a road charge program is adopted. The more technologically advanced methods of the smartphone application with location services and in-vehicle telematics show great promise, but they both need further refinement.

With in-vehicle telematics becoming standard equipment, this method of recording and reporting a road charge has the potential of being a cost effective option. However there are a number of issues needing resolution.

- Within the existing fleet, with telematics, there are a limited number of manufacturer's allowing access to the mileage data collected. Of those manufacturers represented in the Road Charge Pilot Program, participants were required to subscribe to telematics services (i.e. OnStar, AccuraLink), and in some instances at a cost to the vehicle owner.
- The pilot participants were required to provide login credentials to their Account Manager to access the mileage data. This is due in large part to the vehicle software not residing in the vehicle, therefore requiring the Account Managers, through a third-party vendor, to extract the mileage data directly from the manufacturer via cloud, or internet-based, computing.
- The current configuration tested does not allow for the continuous transmission of location data due to the high frequency rate required to ping, or query the vehicle to establish connection and determine location, to verify out-of-state or private road mileage for automatic mileage exemptions. Currently, the cost of this query methodology employed during the pilot is too exorbitant to be feasible for a statewide system.

The resolution of these issues will require close coordination and cooperation with vehicle manufacturers and regulators to ensure the data and services needed to support a road charge program are standardized and readily available for use.

3. Next Steps

The Road Charge Pilot Program successfully tested the functionality, complexity, and feasibility of the critical elements of this potential revenue system - road charge - for transportation funding. However, some questions remain unanswered, necessitating additional investigation into the mechanics and policy issues of implementing a road charge in California.

3.1 PAY AT THE PUMP

In the future, Caltrans in collaboration with the Federal Highway Administration, will be investigating the feasibility of a pay-at-the-pump option for a road charge system. While the mileage reporting methods tested in the Road Charge Pilot Program are all feasible, they cannot compete with the simplicity, cost effectiveness, and public acceptance of the current gas tax collection process. Acknowledging the need to investigate a road charging mechanism that replicates the current user experience, Caltrans is embarking on a study of a pay-at-the pump model that could produce reduced administrative costs over the other methods tested. This method could garner greater public acceptance, as the road charge would be assessed on a pay-as-you-go approach.

If this study results in one or more potential pay-at-the-pump options, the next step will be to continue the partnership with the Federal Highway Administration to conduct a limited demonstration of this mileage reporting option.

As innovators, Californians will continue to stay at the forefront of the ever-evolving technology used to communicate from our vehicles through our transportation infrastructure. The Road Charge Pilot Program was a first step in researching ways for a long-term stable transportation financing model."

- Malcolm Dougherty
Director of the California Department of Transportation

3.2 REVENUE COLLECTION

The collection of revenue was simulated in the Road Charge Pilot Program, through mock invoices and payments. The actual flow of revenue through the state system was not tested, but was reviewed through an institutional analysis. Depending on how the road charge program is designed, there could be a number of state agencies/departments involved in the revenue collection process. Conducting a tandem test of collecting a road charge with the pay-at-the-pump demonstration will provide a controlled environment to evaluate the revenue flows through the state system, allowing identification of challenges, efficiencies, and synergies for future implementation.

3.3 IN-VEHICLE TELEMATICS

The pay-at-the-pump study will address the internal combustion engine mileage collection, but the proliferation of alternative fuel vehicles requires a method for collecting mileage data, such as in-vehicle telematics. More and more auto manufacturers are offering in-vehicle telematics on their new vehicles, and industry analysts are projecting the majority of new vehicles will include in-vehicle telematics by 2020. Developing a road charge program that allows for the collection of mileage data via in-vehicle telematics will provide for the immediate solution for alternative fuel vehicles and a long-term solution for the complete transition off of the gas tax.

The adoption of in-vehicle telematics, as a means for collecting mileage data, could dramatically reduce the impact of the adoption, administration, and enforcement costs of a road charge program. However,

standardization of the mileage information collection and data transference needs to be investigated to allow for open-market application of a road charge. As seen with the telecommunications and tolling industries, proprietary systems reduce or delay entry into the market, thus limiting competition and driving up costs. Early discussions, planning, and development of technical specifications and standards will allow for the greatest level of innovation and competition.

3.4 TECHNOLOGY COLLABORATIVE

With the continuous evolution in technology, the engagement of various state agency/departments, federal and regional/local entities, academia, as well as the private sector interests, would assist in the alignment of emerging technology and road charge. The formation of a technology collaborative, with representatives from the public and private sector will ensure the latest technology will be considered in the formation and development of a road charge program, providing the framework for future evolution of the program.

3.5 ORGANIZATIONAL CONSIDERATIONS

The implementation of a road charge program will not happen overnight. Thoughtful consideration of a multitude of variables is needed to proceed with a statewide road charge program.

One of the initial issues to be studied is the organizational design of the road charge program. There are a number of agencies/departments impacted by the potential transition from the gas tax to a road charge. The early identification of the implementing agency/department will be crucial to the coordination, development, and transition to a statewide road charge program.

Based on the information gathered during the Road Charge Pilot Program, and the acknowledgement of the complexities of developing and adopting a new transportation revenue mechanism, implementing a road charge program prior to 2025 could be problematic. Reviewing the feasibility of a target date for implementation of 2025, or later, will allow time for the designated responsible agency/department to establish the required specifications and regulations, coordinate with other impacted departments, procure vendors, thoroughly design and test systems, and to educate and gather input from the public on the transition.

California currently has over 34 million registered vehicles. Determining the phasing and timing of a potential future transition from the gas tax to a road charge will require careful consideration of the costs and the risks. There are a number of transition scenarios that range from conservative to very aggressive.

4. Conclusion

California is known for its pioneering spirit and environmental leadership. Over the next several decades, California's fleet will become more fuel efficient and less dependent on fossil fuels. These advancements will require an innovative and sustainable approach to how the state funds transportation infrastructure.

When initially instituted, the gas tax methodology was an equitable revenue system, generally due to vehicles having comparable fuel consumption rates. However, as more fuel efficient vehicles are entering the California fleet, the gas tax limitations have become more apparent. As fuel efficiency continues to rise, and more affordable alternative fuel vehicles enter the market, California will experience an overall increase in the average fuel efficiency of the fleet. Continuing to base transportation funding on fuel consumption is not a long-term, sustainable option. Establishing a transportation funding mechanism, based on actual use of the road, instead of the fuel consumption of the vehicle, could provide a fair, equitable, and sustainable transportation funding mechanism for decades to come.

Compounding the effect of improved fuel efficiency was the stagnant gas tax rate. However, after over two decades without an adjustment for inflation, the passage of Senate Bill 1 restored the purchasing power of the gas tax, helping the state address the immediate backlog of transportation maintenance and repair needs.

While much of the concern regarding an immediate funding crisis has been addressed by Senate Bill 1's updates to the existing transportation infrastructure funding mechanism, a road charge program is worthy of further research to prepare the state for a future where most of the cars on the road are powered by alternative energy sources.

The Road Charge Pilot Program confirmed the viability of many aspects of a user-based transportation revenue mechanism. Yet, many obstacles must still be evaluated before transitioning from a gas tax to a road charge is considered. Purposeful research, deliberative planning, and careful application, in a fully transparent process, will help to minimize the risks associated with adopting any new transportation funding mechanism.

Learn more at:
www.californiaroadchargepilot.com/final-report

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