



Caltrans Division of Research,
Innovation and System Information

Research



Results

Planning, Policy
and
Programming

NOVEMBER 2019

Project Title:

National Center for Sustainable
Transportation

Task Number: 3399

Start Date: August 22, 2018

Completion Date: June 30, 2019

Task Manager:

Scott Williams,
Associate Transportation Planner
scott.williams@dot.ca.gov

Implementing Pricing Schemes to Meet a Variety of Transportation Goals

A literature review and recommended implementation of transportation pricing mechanisms for California.

WHAT WAS THE NEED?

The default vehicle pricing mechanism of gasoline/diesel taxes is rapidly becoming defunct: few plans account for inflation, fuel efficiency improvements continue to decrease revenue, and the adoption of electric vehicles render these fees outdated. At the same time, the transportation sector suffers from infrastructure funding shortfalls, transportation emissions are becoming an increasingly important component of climate change mitigation, and congestion continues to worsen in major cities around the world.

This study examined different pricing mechanisms for vehicles to address a number of issues associated with demand of transportation services. These include accessibility to transit, affordability, congestion, equity of use and impacts, and environmental/emissions outcomes.

WHAT WAS OUR GOAL?

The primary idea was to provide a cohesive and realistically implementable strategy that can flexibly roll out pricing schemes as they are developed through use of developing technology (such as vehicle telematics or cell phone applications).

Th researchers examined specific policy actions that can be employed to implement realistic pricing schemes within a discrete time-frame, mirroring the development of new technology and mobility services. They focused on identifying and measuring outcomes of implementation of different pricing schemes to measure their corresponding impacts across a specific set of goals.



Caltrans provides a safe, sustainable,
integrated and efficient transportation
system to enhance California's
economy and livability.

WHAT DID WE DO?

This project corresponded to the sections of the methodology described above. Below is a summary of tasks and their timeline:

- Literature review - Compile a comprehensive set of literature related to pricing schemes for vehicles, as well as empirical examples of existing pricing mechanisms
- Pricing plans and impacts development - Compile a list of pricing mechanisms and assess the impacts on driving behavior
- Implementation strategies - Explore how pricing strategies can be incorporated via policy/regulatory mechanisms and/or through developed vehicle/infrastructure technology
- Policy memo development - Draft a policy memo outlining the findings and policy relevant discussion related to disadvantaged communities and the adoption/benefit of electric vehicles

WHAT WAS THE OUTCOME?

The outcomes of pricing are intimately related with the goals of creating a truly sustainable transportation sector. These fees can serve as the mechanism to meet the goals and provide the right price signals to replicate desired behaviors among drivers.

Vehicle pricing is an economically efficient way to capture these externalities associated with the use of cars and trucks. Road user charges (mileage fees) have been explored by various states in the US and implemented internationally in Europe and New Zealand. Pricing emissions from vehicles has been implemented in cities in China and Italy. Likewise, congestion pricing has already been realized in countries such as Sweden and major cities such as London and Singapore.

WHAT IS THE BENEFIT?

This study examined empirical price elasticity responses to different pricing events to observe variation in driving patterns. These responses vary across a number of different mechanisms, but are able to quantify the effects on travel behavior (such as distance driven, occupancy, etc.). In addition, measuring these impacts will also inform the revenue generated from the different plans and thereby provide insight into the potential monetary gains that could be redistributed to further the goals of any particular agency.

Furthermore, numerous studies have demonstrated that almost every pricing mechanism has successfully reduced the externality they were targeting. As pricing becomes more mainstream and policymakers begin considering these systems, our study aims to provide context for design decisions as it relates to the integration of multiple pricing strategies.

IMAGE

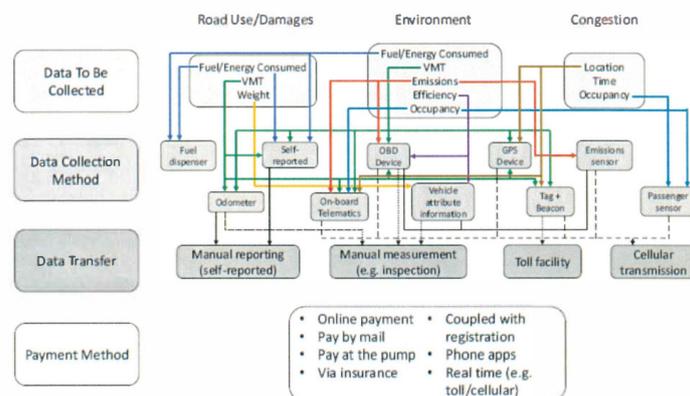


Figure 1: A schema for the possible methods of implementing pricing schemes for three externalities: road usage/damage, environmental impacts, and traffic congestion. Any pricing plan requires design choices that identifies the data that needs to be collected, the technology/method that would collect the data, the method of transferring the data to the appropriate entity, and how the fees are paid. Arrows connect each stage of the pricing scheme.