DRISI
CALTRANS DIVISION OF RESEARCH, INNOVATION AND SYSTEM INFORMATION
TRANSFORMING IDEAS INTO SOLUTIONS

Research Notes

Investigating the Impacts of Smart Charging on Electric Vehicle (EV) Charging Choices Within an Activity-based Framework

This project studies how electricity prices and smart-charging policies influence when and where people charge their electric vehicles. By looking at factors like income, access to home charging, and EV driving range, the research examines how different groups of drivers respond to changing prices or utility-managed charging. Using the Los Angeles region as a case study, the project models future EV growth and charging needs to see how pricing strategies could reduce pressure on public chargers and support reliable grid operations. The results will help the California Department of Transportation (Caltrans) design programs that make EV charging more affordable, efficient, and accessible, supporting the state's transition to cleaner transportation.

Planning/Policy/ Programming

MAY 2026

Project Title: Investigating the Impacts of Smart Charging on Electric Vehicle Charging Choices Within an Activity-based Framework

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WHAT IS THE NEED?

A big challenge is that electricity can be expensive, especially for people with lower incomes who drive electric vehicles. Different electricity rate plans—like paying the same price all day or paying more at certain times—affect when people choose to charge. When electricity is costly, or affordable charging options are limited, it can discourage people from buying EVs and influence how they charge them.

Most past research has used assumed charging patterns instead of looking at how people actually behave. As a result, we don't have a clear picture of how real-world policies and prices affect charging decisions.

This project aims to fill that gap. It will study how pricing that changes by location and time, along with smart-charging policies, affect EV use among different groups of people. By building a model that better reflects real behavior and testing how different conditions affect charging, the project will help identify who benefits, who may be left out, and how to design fair and effective energy and transportation policies. Understanding how well smart-charging works and peoples

Caltrans

DRISI provides solutions and knowledge that improves California's transportation system.

willingness to use it remains a major missing piece that this research will address.

WHAT ARE WE DOING?

The project will study different smart-charging approaches—like prices that change by time or place, utility-managed charging, charging-speed-based rates, and programs that help lower-income households with their bills—to understand how each one affects different types of EV drivers.

To do this, the research will compare results across groups based on income, whether someone has a home charger, and how far their EV can travel on a charge. It will measure how these policies affect overall travel, including changes in vehicle miles traveled and how much money people can save on charging.

The goal is to produce findings that policymakers can use to design programs that manage charging demand, support EV adoption, and make the transportation system work better for everyone. Ultimately, this work will help build a clearer picture of how people charge their EVs today, what barriers they face, and what kinds of policies can improve access and equity as California's transportation network becomes more electric.

WHAT IS OUR GOAL?

The main goal of this project is to understand how electricity prices—especially prices that change by time and location—affect when and how people charge their personal electric vehicles. The study will use existing EV charging models to see how willing drivers are to adjust their charging habits based on prices or grid needs.

The project will also look at how different electricity rates, now and in the future, could change when people plan their daily travel and charging, considering different preferences and how much drivers value their time. Using the Los Angeles area as a case study, the project will model possible future levels of EV ownership and charging stations.

WHAT IS THE BENEFIT?

This project will give Caltrans practical information to help design smart-charging programs that make the transportation system work better. The findings can help the department plan charging in ways that reduce strain on the electric grid, use public resources more efficiently, and support a smoother transition to electric vehicles.

WHAT IS THE PROGRESS TO DATE?

Kick off meeting, May 2026