**Previous Road Charge Research**

**California Research**

- **Road Charge Pilot Program**
  - Tested the feasibility, complexity, security, and acceptability of a road charge program
  - Over 5,000 participating vehicles
  - Statewide pilot (11 percent rural/agricultural; 87 percent urban/suburban)
  - Six mileage reporting methods (*technological and manual*)

- **Organizational Design, Compliance, and Education and Outreach** (STSFA FY2016)

- **Pay-at-the-Pump / Charge Point planning and design** (STSFA FY2016 & FY2017)

- **Federal Tax Administration system** (*pending*)

- **Disadvantaged Community Communications Research**

**With RUC West**

- **Regional Pilot Planning and Design**
  - Concept of Common Operations
  - Outreach and Communications plan
  - Pilot evaluation plan
  - Vendor procurement documentation

- **Policy Considerations**
  - Rural / urban impacts
  - Data privacy and security
  - Fuel efficiency and effects on a road charge
  - Rate setting and pricing schemes

- **Implementation Issues**
  - Technology options and implications
  - Connected and autonomous vehicles
  - Regional certification of private sector partners
Recommendations from previous Road Charge initiatives

The current demonstration will address the majority of directives and recommendations for advancing the road charge concept in California.

- Test and evaluate “pay at the pump” assessment options
- Test and evaluate in-vehicle telematics-based assessment options
- Align tech industry with state agencies and departments pursuing new solutions
- Assess revenue flows through a state road charge system
- Identify and assess administrative and operational costs
- Assess market forces and associated risks
- Assess participation thresholds for system viability
- Identify a preferred organizational approach for road charge
- Refine urban and rural impact assessments
California Road Charge Demonstration Phases

Officially kicked off on July 31, 2019.

Four Phases to demonstrate road charge integration with:

1. **Pay-at-the-Pump/Charge Point (PATP/CP):** Technological devices and/or point-of-sale options within fuel pump and electrical vehicle charging environments.

2. **Usage-Based Insurance (UBI):** Account management through existing usage-based insurance platforms and customer accounts.

3. **Transportation Network Companies (TNCs):** Technology options incorporated in real-time ridesharing vehicles and applications by TNCs.

4. **Autonomous Vehicles (AVs):** Collection of vehicle and occupancy data from AVs and identify road charge opportunities that stem from AV usage of California roadways.

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Key Goals and Objectives:

- Demonstrate the technical, budgetary, and political viability of road charge through four technology platforms
- Establish a flexible, scalable, technology-agnostic platform for continual road charge evolution
- Elevate the road charge discussion in California
- Provide a comprehensive blueprint to advance road charge nationally
# California Road Charge Demonstration Tasks and Schedule

<table>
<thead>
<tr>
<th>TASK</th>
<th>2019</th>
<th>2020</th>
<th>2021</th>
<th>2022</th>
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<tbody>
<tr>
<td>Task 1: Project Management Support</td>
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<td>Task 2: Communications</td>
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<td>Task 3: Design</td>
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<td>Task 4: Risk Analysis &amp; Management</td>
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<td>Task 5: Business Case</td>
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<td>Task 6: Demonstration Preparation</td>
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<td>Task 7: Live Demonstrations</td>
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<td>Task 8: Demonstration Evaluation</td>
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<td>Task 9: State and Federal Reporting</td>
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Research Driven Approach

- Research is tailored to the goals and objectives of the demonstration and advancing road charge in California
- Research synthesis and needs assessment informs research plan
- Research outputs inform several demonstration phases and tasks

Pay-at-the-Pump research needs
Usage-Based Insurance research needs
Transportation Networking Companies research needs
Autonomous Vehicles research needs

Needs Assessment → Research Prioritization

Task 2: Communications
Task 3: Design
Task 4: Risk Analysis & Management
Task 5: Business Case
Task 8: Demonstration Evaluation
Communications

GOALS

• Target an increasingly diverse group of stakeholders, elected officials, and Californians

• Develop a culturally competent brand and associated messaging

• Cast a vision about the future of transportation in California

• Equip Caltrans to communicate the business case for road charge in California

Formal Communications Plan

<table>
<thead>
<tr>
<th>OBJECTIVE:</th>
<th>Integrate Road Charge into a vision of the future of transportation in California</th>
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<tr>
<td>GOALS:</td>
<td>- Educate key audiences</td>
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<td>- Minimize political risk</td>
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<td>- Do no harm</td>
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<tr>
<td>AUDIENCES:</td>
<td>Local, state, and federal policymakers; transportation, community, and other stakeholders; voting public</td>
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<tr>
<td>CHANNELS:</td>
<td>Existing Caltrans channels, technology partners, earned media, stakeholders, and policymakers</td>
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</tbody>
</table>
Objective: Develop and maintain a registry of financial, programmatic, policy, procurement, and technical risks, mitigation measures, and strategies.

- Project team will establish a method for documenting, categorizing, scoring, and prioritizing each risk over the course of the project
  - Updated routinely
  - Monthly reporting

- Risk Assessment Report
  - Tailored to the unique aspects of each demonstration phase
  - Establishes processes and best practices for risk identification, analysis, communication, and management
Business Case

**Objectives:**
- Describe the benefits, risks, costs, technical solutions, and potential impacts of a road charge to current business practices, operations, and capabilities.
- Determine the net revenue potential of road charge alternatives as compared to current transportation revenue collection mechanisms.

**Activities:**
- Estimation of capital and operating costs, potential revenue leakage.
- Determine updates and improvements to revenue models.
- Account for various scenarios driving future revenues over a 20 or 30-year horizon.
- Market research to identify transportation trends with a direct or indirect impact on the business case and revenue model.
Evaluation Research and Strategy

**Objective:** Comprehensively assess and evaluate the demonstration’s performance in each of the four phases

Project team will develop an evaluation strategy and associated criteria

Both quantitative and qualitative analyses will be conducted

**Evaluation will include all activities:**

- Demonstration planning (design, testing, recruiting, and onboarding)
- Demonstration operations
- Customer service responses and participant feedback (survey and focus groups)
- Demonstration closeout
Technical Design

- Utilize FHWA’s System Engineering Management framework to establish a System Engineering Management Plan (SEMP)
- Research, synthesize and revise existing California technical and functional documents
- Develop a Concept of Operations (ConOps)
  - Defines the California road charge demonstration system from the stakeholder viewpoint, capturing goals and objectives, high-level business requirements, and operational scenarios the system is expected to execute
- Develop necessary technical documentation (Tech Requirements, Business Requirements, Customer Service Guides, Interface Specs, Test Procedures, and Implementation Guide)
- Establish a central repository and processing warehouse to support the next evolution of road charge
  - “Platform for Road charge Innovation and Mobility Evolution” (PRIME)
Platform for Road charge Innovation and Mobility Evolution (PRIME)

**Analytics Examples**
- Traffic Modeling
- EV Charging Stats
- Emissions
- Road Weather Info
- GIS Map Updates
- Travel Patterns
- Vehicle Fleet Sampling
- VMT Modeling

Road Charge Assessment and Account Management

Platform for Road charge Innovation and Mobility Evolution (PRIME)

Dashboards and Analytics Engine
Demonstration Preparation

• Participant recruitment for each of the four phases. There will be variance in participant pool sizes and geographic coverage

• Phase Testing:
  – **Unit Testing**, detailed testing of each individual component to make sure it meets all requirements;
  – **Integration Testing**, validating how components work together and are able to communicate with each other;
  – **Data Security Auditing**, validating data security and integrity using industry standards such as ISO 27001, PCI DSS 3.2, and NIST 800-53; and
  – **Acceptance Testing**, a comprehensive, end-to-end verification of PRIME and the customer service and administrative processes that will be in place for the demonstration.

• Two-week Demonstration Dry Run, a full end-to-end systems dry run with Caltrans and WSP team members
Demonstration Operations

- WSP will monitor operations activities, vendor performance, stakeholder engagement, and customer experience throughout all phases of the demonstration.
- A “white glove” level of customer support will be provided.
- Simulated payments by participants in conjunction with the services they are already using.
- Analytics and dashboards capability of PRIME will be showcased.
- Continual reporting on key metrics and data points by WSP.
• ITS Berkeley, in partnership with the demonstration, will:
  – **Identify the financial burden of road charge to rural and disadvantaged communities**
  – **Assess how user experience with each technology option impacts these user groups**
  – **Assess how technology options influence travel behavior and improve mobility**

• **Focus on the variation across road charge assessment and account management mechanisms (frequency of billing and the point of sale)**
  – **Usage-based insurance can be billed on a periodic basis**
  – **Transportation networking companies (TNC) billed as a line item on a trip fare**
  – **Point-of-sale (charge point or fuel pump) is periodic but directly related to road use**
Online survey of 3,500 residents (a general population survey) across four regions of California. Survey will collect:

- Socio-demographic information;
- Revealed travel behavior (e.g., typical modes used, vehicle ownership, commute patterns, etc.);
- Transportation expenditures

Results used to estimate the sensitivity of travel demand:

- Under different trip contexts;
- With and without information regarding incurred road charge;
- Information presented in formats that mimic the variations in billing frequency and point of sale in the demonstration
• California demonstration participants assessed for their behavioral impacts and equity effects.

• Participant data analyzed and compared with Phase I results to assess:
  – Sensitivity of mode choice and travel demand (based upon vehicle use and type, trip purpose, etc.);
  – Value and impact of information provided on road charge;
  – Impact of rate setting (revenue generation) in achieving equity goals;
  – Individual and aggregate (statewide) impacts from travel behavior changes from demonstration phases and associated rate structures
Caltrans’ Path Ahead

Pay at the Pump Demonstration/Current Research

Assess Current Status of Research

Identify Key Unanswered Questions
May include examination of administrative frameworks, impacts to disadvantaged communities, privacy issues, or telematics and other technological advances

Develop Research Plan

Develop and Execute Additional Research and Demonstrations

2020
Fall | Winter | Spring | Summer | Fall | Winter

2021
Spring | Summer | Fall | Winter | Spring | Summer | Fall | Winter

2022