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Shared Mobility Policy Briefs: Definitions, Impacts, and Recommendations

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# Shared Mobility Policy Briefs: Definitions, Impacts, and Recommendations

A Research Report from the University of California Institute of Transportation Studies

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*March 2018*

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<b>16. Abstract</b> In 2017, researchers from UC Berkeley's Transportation Sustainability Research Center and Institute of Transportation Studies produced eight policy briefs on shared mobility. Shared mobility – the shared use of a vehicle, bicycle, or other travel mode – services are experiencing rapid growth and expansion. This is, in part, due to the launch of innovative business models across California, and their use of the smartphone as a way to enable on-demand transportation options. There is a need to clarify emerging terms and best practices for policymakers amidst the fast-paced developments of the field. Fluency in data sharing opportunities and standards, funding options, and equity considerations will be needed to implement flexible, forward-thinking policies. These topics are covered in the briefs that follow. Each brief includes a presentation of research findings, description of the research approach, and recommendations for the California Legislature. Policymakers and legislatures can refer to these briefs for digestible explanations of research findings and suggestions of ways to apply research to improve California's transportation system.			
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# Shared Mobility Policy Briefs

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UNIVERSITY OF CALIFORNIA INSTITUTE OF TRANSPORTATION STUDIES

March 2018

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## **ABSTRACT**

In 2017, researchers from UC Berkeley’s Transportation Sustainability Research Center and Institute of Transportation Studies produced eight policy briefs on shared mobility. Shared mobility – the shared use of a vehicle, bicycle, or other travel mode – services are experiencing rapid growth and expansion. This is, in part, due to the launch of innovative business models across California, and their use of the smartphone as a way to enable on-demand transportation options. There is a need to clarify emerging terms and best practices for policymakers amidst the fast-paced developments of the field. Fluency in data sharing opportunities and standards, funding options, and equity considerations will be needed to implement flexible, forward-thinking policies. These topics are covered in the briefs that follow. Each brief includes a presentation of research findings, description of the research approach, and recommendations for the California Legislature. Policymakers and legislatures can refer to these briefs for digestible explanations of research findings and suggestions of ways to apply research to improve California’s transportation system.



# EXECUTIVE SUMMARY

Shared Mobility – the shared use of a vehicle, bicycle, or other travel mode – is a transportation strategy that has expanded dramatically following the widespread adoption of mobile phones with GPS capabilities. This report includes eight separate policy briefs that cover different aspects of shared mobility. Each brief provides an introduction to the topic, the research approach taken, relevant findings, and concludes with policy recommendations, often directed toward California’s state legislature. In this executive summary, we provide a summary of each brief, focusing on key highlights from each.

## ***1. Overview of Shared Mobility***

To reduce confusion, clarifying definitions of shared mobility terms will be beneficial to policymakers, service operators, users, and researchers. Understanding distinctions across various shared mobility business models can support comprehensive policy development. Since shared mobility planning impacts housing, economic development, zoning, land use, and climate action, the California legislature could take advantage of the opportunity to establish statewide definitions of shared modes, such as the California Public Utilities Commission did with “transportation network companies” (TNCs). In addition, funding should be increased for communities to run shared mobility pilots and public-private partnerships, which divide risk across multiple parties.

## ***2. Impacts of Shared Mobility***

Although some shared mobility services are still novel, recent studies have attempted to quantify their impacts. The Impacts of Shared Mobility brief presents the impacts of roundtrip carsharing, one-way carsharing, and bikesharing, to date. These include the degree to which members sell vehicles; delay vehicle purchases; increase their use of alternative transportation modes (e.g., cycling and walking); and reduce fuel consumption and greenhouse gas (GHG) emissions. Change in travel behavior is also observed by measuring changes in vehicle miles traveled (VMT). To encourage more comprehensive studies of shared mobility impacts, the state should collect data on individual use of shared modes in the California Household Travel Survey, mandate private sector data sharing as a requirement for use of public rights-of-way, and develop a statewide repository for California transportation data.

## ***3. Shared Mobility Policies for California***

Some municipalities have adopted policies that integrate shared mobility into urban zones. These policies include: distributing public rights-of-way; easing zoning regulations and reducing parking requirements for land use developments; and creating insurance frameworks that include provisions for peer-to-peer carsharing, taxis, and ridesourcing/TNCs. Existing regulations should avoid adding taxes to shared mobility modes that could raise costs for consumers. We suggest paying close attention to sales taxes, rental car-specific taxes, transaction fees, and excise taxes, specifically. California has addressed some of these issues

directly, including building insurance models for ridesourcing companies/TNCs and shared personal vehicles and distributing credits for zero-emission vehicles.

#### ***4. Smartphone Applications and Data Impacting Transportation***

To understand the full impacts of shared mobility on users and public rights-of-way, it is critical to consider the mobile applications that have encouraged their rapid adoption. Users of almost every shared mobility service access them via mobile smartphone applications. These apps can be built and provided by a shared mobility service operator (e.g., Lyft, JUMP). Third-party aggregation apps also display useful travel information, such as traffic conditions and real-time train departures, from a variety of sources. Other app categories include courier network services (CNS), which offer for-hire, on-demand goods delivery service (e.g., Postmates); vehicle connectivity apps that allow remote access to a vehicle; and smart parking apps. However, data interoperability across platforms and companies is a key challenge. To address this, states could require open data standards for shared mobility operators.

#### ***5. Impacts of Shared Mobility: Pooling***

One of the most significant advantages of shared mobility is pooling the rides of passengers with similar destinations in the same vehicle. Pooling is a feature of ridesourcing companies/TNCs, carpooling and vanpooling, taxisplitting, and microtransit. Since it maximizes vehicle occupancy while reducing the number of vehicles needed to make a similar trip, pooling reduces energy consumption, eases congestion, and reduces parking demand. Companies like Scoop, Waze Carpool, Chariot, and Via enable pooling along defined routes, and take advantage of advanced routing software to aggregate and analyze passenger demand for pickup locations. To encourage pooling, municipalities and businesses can create incentives, such as carpool lanes, reserved parking spots, and dedicated curbside space for pickups and drop offs.

#### ***6. Pooling Passengers and Services***

Due to its tangible benefits, policymakers are considering using transportation user fees and other innovative funding mechanisms to encourage pooling. To implement financial incentives that encourage pooling, it is important to consider how shared mobility is distinct from traditional public transit finance mechanisms. For example, the maximum corridor capacity of UberPOOL is much smaller than that of a public bus. In addition, the desire for short-term increases in public revenues could lead to short-sighted solutions, signaling that flexibility should be built into innovative financial mechanisms. Besides pooling passengers, shared modes can also pool goods. Infrastructure access policies that emphasize efficiency can decrease externalities in urban areas (double parking, congestion, idling, etc.), particularly due to the lower elasticity of demand to delivery fees.

#### ***7. Road Usage Charging (RUC)***

Pricing infrastructure, such as through road usage charging (RUC), can create viable revenue sources nationally and statewide. However, there are legal barriers to implementing new funding mechanisms. For example, California currently prevents the assessment of new charges

for using existing streets and roads. The growth of shared mobility systems and the rapidly changing nature of the transportation field are creating opportunities to define flexible and sustainable revenue sources. RUC mechanisms could consider innovative modes by creating pricing options based on shared mobility services. Pricing adjustments based on occupancy, distance traveled, and revenue generation can be integrated into RUC schemes, particularly when shared mobility operators are partners. Operators could collect RUC fees when partnered with state agencies, for example.

### ***8. Equity and Shared Mobility***

Amidst the rapid expansion of shared mobility networks, it is critical to ensure that these services are accessible for every neighborhood and demographic. Barriers to access include low rates of smartphone ownership (i.e., the “digital divide”) and bank accounts among lower income demographics. Although shared modes have the potential to increase accessibility for persons with disabilities, not all operators have incorporated considerations of disabled populations into their service models. There are a number of laws, including the Civil Rights Act, that prohibit discrimination in the transportation sector, and yet many still face difficulties in accessing and using these services. We propose three focus areas for the California legislature to ensure more equitable transportation access and provide historical context on laws that impact transportation: 1) bridging the digital divide, 2) extending access to unbanked and underbanked users, and 3) mandating accommodations for passengers with special needs. We also recommend applying the Unruh Civil Rights Act to transportation service providers as “business establishments,” and providing more education about the Disabilities Rights Act to service providers.

# Overview of Shared Mobility

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## KEY TAKEAWAYS

## TOPIC/ISSUE

### What is Shared Mobility?

Shared mobility—the shared use of a vehicle, bicycle, or other travel mode—is an innovative transportation strategy that enables users to have short-term access to a transportation mode on an as-needed basis (1). Shared mobility includes various service models and transportation modes that meet diverse traveler needs. Shared mobility can include roundtrip services (vehicle, bicycle, or other travel mode is returned to its origin); one-way station-based services (vehicle, bicycle, or other mode is returned to a different designated station location); and one-way free-floating services (vehicle, bicycle, or low-speed mode can be returned anywhere within a geographic area).

## RESEARCH FINDINGS

In 2016, one national study defined shared modes based on interviews and a literature review (1). Figure 1 provides an overview of the shared mobility service models. Table 1 provides definitions of the most common shared mobility models.

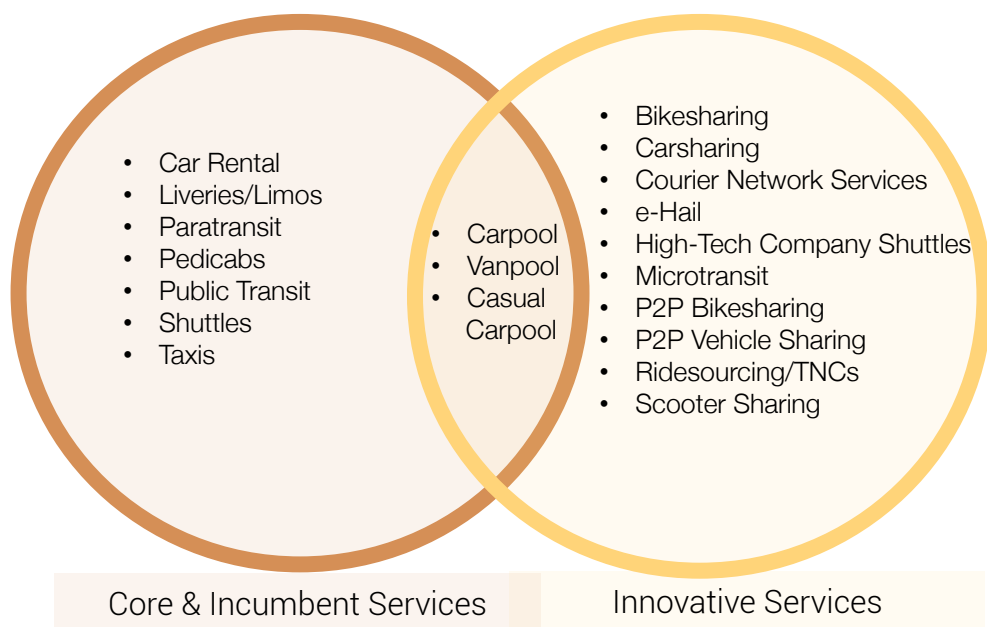


Figure 1 (1)

**“Consistent definitions** across a suite of shared mobility service models **can guide public policy and distinguish between types of services** for users.”

## RESEARCH FINDINGS (continued)

<b>Bikesharing</b>	Users access bicycles on an as-needed basis for one-way (point-to-point) or roundtrip travel. Station-based bikesharing kiosks are typically unattended and concentrated in urban settings and offer one-way service (i.e., bicycles can be returned to any kiosk). Dockless bikesharing offers users the ability to check out a bicycle and return it to any location within a predefined geographic region. Generally, trips of less than 30 minutes are included with many bikesharing membership fees. Users can access a bikesharing program on an annual, monthly, daily, or per-trip basis (1).
<b>Carsharing</b>	Individuals gain the benefits of private-vehicle use without the costs and responsibilities of ownership. Individuals typically access vehicles by joining an organization that maintains a fleet of cars and light trucks deployed in lots located within neighborhoods and at public transit stations, employment centers, and colleges and universities. Typically, the carsharing operator provides gasoline, parking, and maintenance. Generally, participants pay a fee each time they use a vehicle (1).
<b>Courier Network Services</b>	These services provide for-hire delivery of packages, food, or other items for compensation. They use an online-enabled application or platform (such as a website or smartphone app) to connect delivery drivers using a personal transportation mode (2).
<b>e-Hail Apps</b>	Smartphone apps that connect taxi drivers with passengers (2).
<b>Ridesharing</b>	Ridesharing (carpooling and vanpooling) facilitates formal or informal shared rides between drivers and passengers with similar origin-destination pairings (1).
<b>Ridesourcing/ Transportation Network Companies (TNCs)</b>	Ridesourcing services (also known as TNCs) provide prearranged and on-demand transportation services for compensation, which connect drivers of personal vehicles with passengers. Smartphone applications are used for booking, ratings (for both drivers and passengers), and electronic payment (2).
<b>Microtransit</b>	Microtransit can include fixed-route or flexible-route services as well as offer fixed schedules or on-demand service. In its most agile form (flexible routing and scheduling), microtransit and paratransit can be bundled under the category of flexible transit services.

## APPROACH

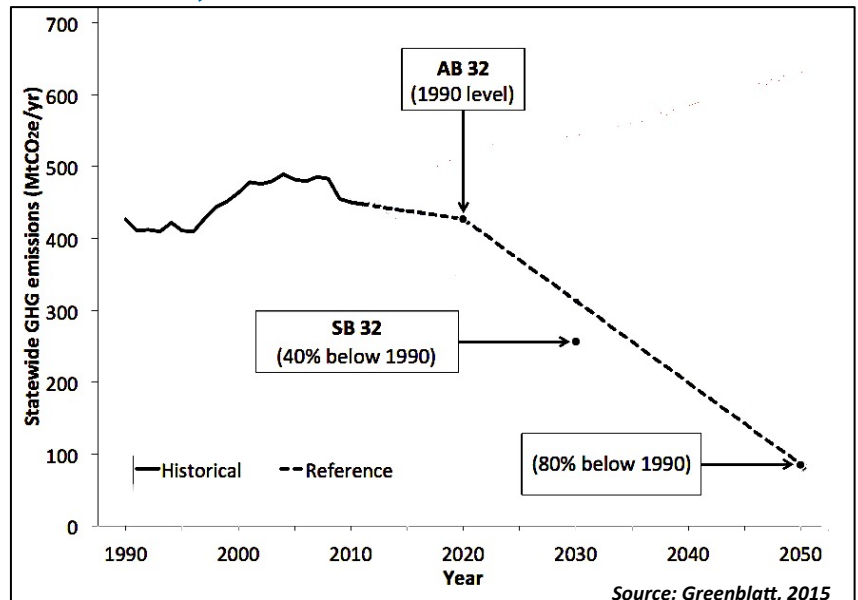
*Table 1 (1)*

Shared mobility directly influences and is influenced by numerous transportation, housing, labor, and environmental policies in the State of California.

- **Transportation:** Shared mobility can influence travel patterns, such as modal choice, vehicle occupancy, and vehicle miles traveled. Policymakers can leverage positive impacts to aid in congestion mitigation, greenhouse gas reductions (e.g., AB 32 and SB 32) and incorporate shared mobility into regional sustainable communities strategies (e.g., SB 375).
- **Zoning, land use, and growth management:** Shared mobility can affect land use-related planning factors including: zoning requirements (e.g., parking minimums), parking demand, and the use of public rights-of-way. As such, shared mobility can represent a key strategy to encourage sustainable communities.

## APPROACH (continued)

- Housing:** Shared mobility can support affordable housing strategies by potentially reducing parking demand and allowing for reduced minimum parking requirements at new developments.
- Economic development:** Shared mobility can create new opportunities for employment and generate revenue from underused resources.
- Healthy Lifestyles:** Shared mobility can support healthy lifestyles by promoting walking and cycling, providing active first-and-last-mile connections to public transportation.
- Environmental policy, conservation, and climate action:** Shared mobility has the potential to reduce the negative impacts commonly associated with surface transportation, such as GHG emissions and can help California agencies achieve AB32 and SB32 GHG reduction targets.



## CONCLUSIONS AND RECOMMENDATIONS

Insights into shared mobility can aid California agencies in understanding impacts on public infrastructure, implementing supportive policies, and making informed transportation and development decisions.

### The Legislature should consider the following:

- Establish statewide definitions of shared modes consistent with federal definitions.** Establishing consistent definitions is essential for mainstreaming shared mobility and enabling public agencies to clarify policies related to insurance, taxation, rights-of-way, parking, and zoning.
- Expand transportation and sustainable communities funding for shared mobility pilots and risk-sharing partnerships.** To augment the California Air Resources Board Low Carbon Transportation programs, California should consider incorporating shared mobility into the Strategic Growth Council's (SGC) Affordable Housing and Sustainable Communities Program (AHSC) and Transformative Climate Communities (TCC) Program.

#### References

- Shaheen, S.; Cohen, A.; and Zohdy, I. (2016). *Shared Mobility: Current Practices and Guiding Principles*. FHWA Report 16-022. U.S. Department of Transportation: Washington, D.C.
- Shaheen, S.; Cohen, A.; Zohdy, I.; and Kock, B. (2016). *Smartphone Applications to Influence Travel Choices*. FHWA Report 16-023. U.S. Department of Transportation: Washington, D.C.

This policy brief was generously funded by the State of California Public Transportation Account.

# Impacts of Shared Mobility

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## KEY TAKEAWAYS

- Understanding the impacts of shared modes can aid policymakers in leveraging the positive impacts and taming negative impacts to achieve public policy goals.
- The impacts of shared mobility vary depending on service model, local attributes, and time of day. More research is needed to understand full impacts.

“California’s climate action planning has raised awareness among public agencies about shared mobility services as a transportation strategy and its impacts on the transportation network.”

## TOPIC/ISSUE

### Environmental, Social, and Behavioral Impacts

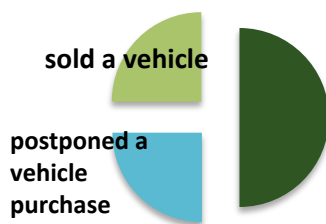
Several studies have documented the reduction of vehicle usage, ownership, and vehicle miles traveled (VMT) due to shared mobility. Cost savings and convenience are frequently cited as popular reasons for shifting to a shared mode. Shared modes can also extend the catchment area of public transit, potentially playing a pivotal role in bridging gaps in existing transportation networks and encouraging multi-modality by addressing the first-and-last mile issue related to public transit access (1). Shared mobility is also thought to provide economic benefits in the form of cost savings, increased economic activity near public transit stations and multi-modal hubs, and improved access by creating opportunities for new trips not previously possible via traditional public transportation and by enabling new one-way (or point-to-point) service options that were previously unavailable. They have also been shown to compete with other modes (e.g., public transit, taxis, private auto) in some cases.

## RESEARCH FINDINGS

A number of academic and industry studies of shared mobility, predominantly based on self-reported survey data, have collectively shown the following policy-related outcomes (1):

- Sold vehicles or delayed or foregone vehicle purchases in the case of carsharing;
- Increased use of some alternative transportation modes (e.g., walking, biking);
- Reduced VMT when bikesharing, carsharing, and ridesharing (carpooling/vanpooling);
- Increased access and mobility for formerly carless households;
- Reduced fuel consumption and greenhouse gas (GHG) emissions when using bikesharing, carsharing, and ridesharing; and
- Greater environmental awareness.

### Impacts of Roundtrip Carsharing (2, 3)



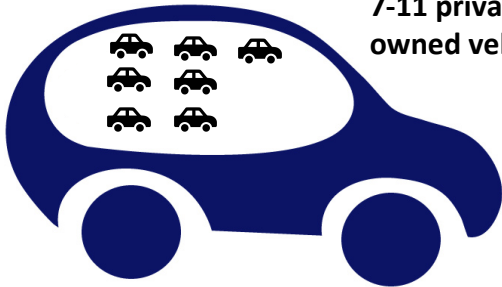
**1 carsharing vehicle replaces 9-13 privately owned vehicles**

Reduction of GHG emissions per year for one household	Reduction of VMT per year for one household	Monthly household savings per US member after joining carsharing
34 – 41%	27 – 43%	\$154 – 435

# RESEARCH FINDINGS (continued)

## Impacts of One-Way Carsharing (4)

1 **carsharing vehicle** replaces  
7-11 privately  
owned vehicles



Average reduction of  
GHG emissions per  
household

4 – 18%

Average reduction of  
VMT per household

27 – 43%



San Diego



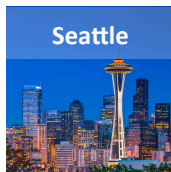
Vancouver



Washington, DC



Calgary



Seattle

## Impacts of Bikesharing (5)



- **Large cities:** Bikesharing members rode the bus less due to reduced cost and faster travel
- **All cities:** Increased bus use due to improved access to / from a bus line



- **Small cities:** Increased rail use
- **Large cities:** Decreased rail use due to faster travel times and cost savings of bikesharing



5.5%

Bikesharing members sold or postponed a vehicle purchase



58%

Bikesharing members increased cycling



50%

Bikesharing members reduced personal vehicle use

## APPROACH

Research on shared mobility can aid policymakers and public agencies in understanding the impacts of shared modes on public infrastructure and policy. However, differences in service models, data collection, and study methodologies can produce inconsistent results due to limited survey samples and aggregate-level analyses (often attributed to proprietary issues). Thus, it can be challenging to provide a comprehensive and unbiased picture.

While automated traveler activity data can offer a rich understanding, these data typically do not capture changes in auto ownership, travel behavior across all modes, and respondent perceptions over time. While self-reported travel behavior surveys may have validity issues—including respondents exaggerating travel behaviors, underreporting the extent or frequency of travel, or reporting inaccurately as well as sample bias—they can offer another source of behavioral understanding.



# CONCLUSIONS AND RECOMMENDATIONS

The California Legislature should consider the following policies:

- **Collect data** on the usage of individual shared modes as part of the California Household Travel Survey.
- **Require private sector data sharing** (protected repository) as a condition for operating on public rights-of-way.
- **Develop a statewide repository for public and private sector transportation data** and exempt personal traveler data from release under the California Public Records Act to protect privacy and proprietary data.
- **Fund ongoing research on:**

**1)** The types of policies and government reforms needed to foster transportation innovations.

**2)** The net state gross domestic product impacts of monetizing underused resources versus the potential impacts of reduced vehicle ownership, higher vehicle turnover (due to fleet usage), and measuring the potential economic impacts of future transportation technologies.

**3)** Development of a statewide strategy for information and communications technologies (ICT) to build the fiber optics and other digital infrastructure needed to advance the State's transportation network into the 21st century and beyond. This assessment should identify ICT infrastructure performance, as well as current and future ICT capacity needed for the deployment of emerging and future transportation technologies (e.g., connected and shared automated vehicles).

## References

1. Cohen, A. and Shaheen, S. (2016). *Planning for Shared Mobility*. Planning Advisory Service Report 583. American Planning Association: Chicago.
2. Martin, E. and Shaheen, S. (2010). Greenhouse Gas Impacts of Carsharing in North America. Report 09-11. Mineta Transportation Institute: San Jose.
3. Martin, E. and Shaheen S. (2011) The Impact of Carsharing on Public Transit and Non-Motorized Travel: An Exploration of North American Carsharing Survey Data. *Energies* 4, 2094- 2114.
4. Martin, E. and Shaheen, S. (2016). Impacts of car2go on Vehicle Ownership, Modal Shift, Vehicle Miles Traveled, and Greenhouse Gas Emissions: An Analysis of Five North American Cities. Transportation Sustainability Research Center: Berkeley.
5. Shaheen, S. et al. (2014) Public Bikesharing in North America During a Period of Rapid Expansion: Understanding Business Models, Industry Trends & User Impacts." Mineta Transportation Institute, Report 12-29.

*This policy brief was generously funded by the State of California Public Transportation Account.*

# Shared Mobility Policies for California

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## KEY TAKEAWAYS

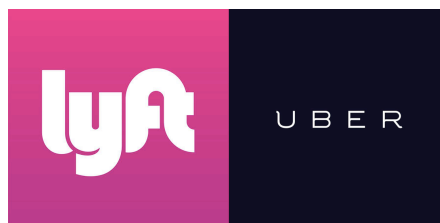
- The Legislature should consider amending California Environmental Quality Act (CEQA) when projects include shared modes with documented reductions in vehicle miles traveled, vehicle trips, or GHG emissions.
- The extension of zero emission vehicle (ZEV) credits to shared mobility operators may accelerate the exposure of zero emission vehicles (ZEVs) to the general population.

“Local and state statutes, regulations, and policies can have notable impacts on the success and viability of shared mobility in California.”

## TOPIC/ISSUE

### Developing Shared Mobility Policies for California

In recent years, economic, environmental, and social forces have quickly given rise to the “sharing economy,” a collective of entrepreneurs and consumers leveraging technology to share resources, save money, and generate capital. Shared mobility—the shared use of a vehicle, bicycle, or other low-speed travel mode—is an innovative transportation strategy that enables users to have short-term access to a transportation mode on an as-needed basis (1). Business-to-consumer services, such as Zipcar and car2go, and peer-to-peer carsharing and shared ride services, such as Getaround, Turo, Lyft, and Uber, have become part of a sociodemographic trend that has pushed shared mobility from the fringe to the mainstream. Local, regional, and state laws, ordinances, codes, zoning, and environmental policies can have unintended impacts on the success and viability of shared mobility in California (2).



## RESEARCH FINDINGS

One national study of shared mobility revealed, from interviews and a literature review, common ways local, regional, and state policies impact shared mobility including (2):

- **Public Rights-of-Way:** Numerous procedures focus on managing public rights-of-way, which allow the passage of people and goods, along public and sometimes private property (typically through licenses and easements). Local governments and public agencies can implement formal and informal policies to allocate public rights-of-way, such as curb space and parking.
- **Land Use (Zoning and Parking):** California governments can also implement an array of policies aimed at easing zoning regulations and parking minimums to promote the inclusion of shared mobility in new developments.
- **Zoning:** Policies that allow increased density include greater floor-to-area ratios, more dwelling units permitted per acre, and greater height allowances for the inclusion of shared mobility into developments.
- **Parking:** Common parking policies include parking reductions (downgrading the required number of spaces in a new development) and parking substitution (substituting general use parking for shared modes).



# RESEARCH FINDINGS (continued)

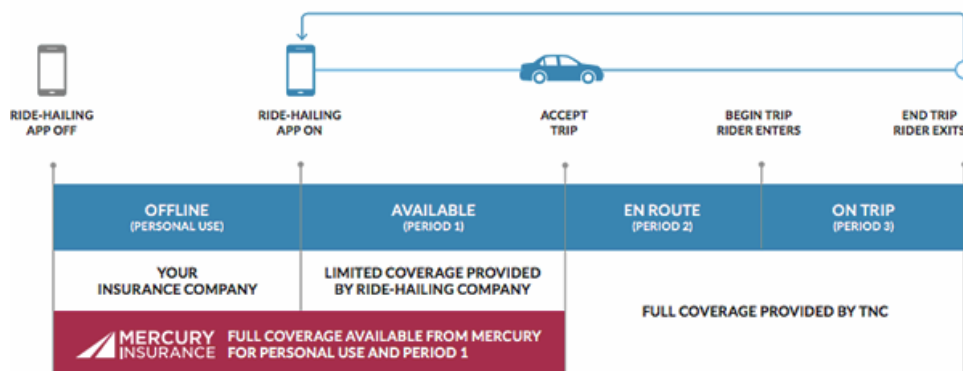
- Insurance: Insurance regulations can make shared modes cost prohibitive or they can ban operations in a jurisdiction altogether. Common insurance policies impacting shared mobility include provisions for peer-to peer carsharing insurance and insurance coverage for, for-hire vehicle services, such as ridesourcing/transportation network companies (TNCs) and taxis.
- Taxation: Taxing shared mobility can raise end-user service costs. Four types of taxes that are levied on shared modes include:
  1. State, county, and municipal sales taxes applied to shared mobility (e.g., percentage-based taxes on sales or receipts from sales);
  2. Rental car taxes (e.g., state and local percentage-based taxes on the transaction value of a vehicle rental);
  3. Transaction fees and per-use excise taxes (e.g., a fixed-rate tax or fee applied to a transaction); and
  4. Miscellaneous taxes applied to shared mobility (e.g., percentage-based and fixed-rate taxes used to fund public transportation and special projects, such as convention centers and arenas).

Tax Type	State, county, municipal sales taxes	State, local transaction taxes	Transaction fees/ per-use excise tax	Miscellaneous
Description	Applied to shared mobility services	Percentage-based tax applied to rental car transaction value	Fixed-rate tax or fixed fee per transaction	Percentage-based, fix-rate taxes applied to shared mobility to fund projects and public transportation

## APPROACH


**Definition of Transportation Network Companies (TNCs):** In 2013, the California Public Utilities Commission defined a TNC as for-hire ride services that use drivers’ private vehicles and are facilitated through smartphone apps or similar online platforms (e.g., Lyft, Uber).

- Insurance for TNCs: AB 2293 established new insurance limits for on-demand ride services and prohibits private auto insurance from subsidizing commercial activities. The law requires \$200,000 of insurance coverage during the “app-on-to-match” period and \$1 million primary coverage from the time a driver accepts a match until the passenger exits the vehicle.



TNC Insurance Coverage, Source: Uber

## APPROACH (continued)

- Insurance Provisions for Personal Vehicle Sharing:** AB 1871 revised California's insurance laws to cover peer-to-peer mobility services and require companies to provide vehicle liability insurance and assume liability in the event of loss or injury while a vehicle is in use by these services. The law also prohibits a vehicle owner's liability insurer from canceling a policy or reclassifying use from a private passenger motor vehicle to a commercial-use vehicle because of its placement in a personal vehicle sharing program.
- 
- Zero Emission Vehicle (ZEV) Transportation System Credits:** In 2001, the California Air Resources Board (ARB) adopted incentives for ZEVs placed into shared mobility fleets. This policy is set to expire in 2018. As such, carsharing services have been a mechanism for introducing people to ZEVs and the possible purchase of a low-emission vehicle due to exposure to this technology (3).

## CONCLUSIONS AND RECOMMENDATIONS

Incorporating shared mobility into existing environmental and planning policy may help California agencies achieve greenhouse gas (GHG) reduction targets.

- Shared mobility** is one strategy that **could aid local governments in achieving AB32** (Climate Change Legislation focused on 2020), SB32 GHG (focused on 2030) emission targets, and compliance with SB 743 (emphasizes vehicle miles traveled (VMT) reductions).
- Under SB 375, each metropolitan planning organization (MPO) must prepare a sustainable communities strategy (SCS) as part of the regional transportation plan (RTP) process. **Incorporating shared mobility into a regional SCS may help MPOs achieve GHG reductions** by reducing motor vehicle trips.
- ARB should consider extending the ZEV transportation systems incentive credits for shared mobility operators** to accelerate the exposure of ZEVs to the general population.
- The Legislature should consider **amending CEQA to allow a mitigated negative declaration for projects incorporating shared mobility**, where the shared modes incorporated have been documented through research to reduce VMT, vehicle trips, or GHG emissions.
- The Governor's Office of Planning and Research should consider **revising General Plan Guidelines to provide guidance for incorporating shared mobility** into circulation elements.

### References

- Shaheen, S.; Cohen, A.; and Zohdy, I. (2016). Shared Mobility: Current Practices and Guiding Principles. FHWA Report 16-022. U.S. Department of Transportation: Washington, D.C.
- Cohen, A. and Shaheen, S. (2016). Planning for Shared Mobility. Planning Advisory Service Report 583. American Planning Association: Chicago.
3. "Zero- and Low-Emission Vehicles in U.S. Carsharing Fleets: Impacts of Exposure on Member Perceptions." 2017. Innovative Mobility Research.

*This policy brief was generously funded by the State of California Public Transportation Account.*

# Smartphone Applications and Data Impacting Transportation

Susan Shaheen, PhD and Adam Cohen  
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## KEY TAKEAWAYS

- Smartphone apps are transforming mobility by improving access to transportation services, increasing mobility, and enhancing traveler engagement.
- Smartphone apps are spawning innovative transportation businesses, services, and mobility models.

“Real-time data, mobile Internet, and smartphone apps are transforming California’s transportation system.”

## TOPIC/ISSUE

### How Do Mobility Applications Affect Behavior?

Demographic shifts, improvements in computing power and mapping technology, the use of cloud computing, and changes in wireless communication — coupled with the growth of data availability and data sharing — are changing the way people travel. Increasingly, mobility consumers are turning to smartphone “apps” for a wide array of transportation activities including: vehicle routing, real-time data on congestion, information regarding roadway incidents and construction, parking availability, and real-time transit arrival predictions (1). Travel time savings (e.g., high occupancy vehicle lanes available to users of shared-ride services); financial savings (e.g., dynamic pricing providing discounts for peak and off-peak travel and for choosing low-volume routes); incentives (e.g., offering points, discounts, or lotteries); and gamification (e.g., use of game design elements in a non-game context) are among the key factors driving end-user growth of smartphone transportation applications (1).

## RESEARCH FINDINGS

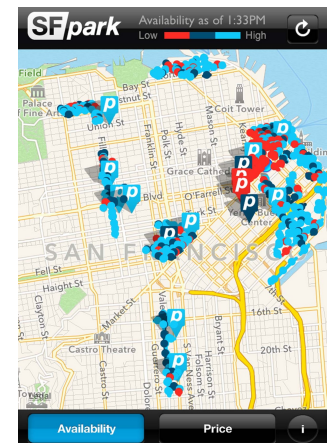
One national study of smartphones and mobile technologies revealed, from interviews and a literature review, how vital smartphones and the mobile Internet are becoming to the transportation network (1). Four broad categories of apps impact transportation. These categories represent the apps’ primary function: 1) mobility apps; 2) vehicle connectivity apps; 3) smart parking apps; and 4) courier network services (CNS) apps.

**Mobility Apps** have the primary function of assisting users in planning or understanding their transportation choices and may enhance access to alternative modes.

**Vehicle Connectivity Apps** allow remote access to a vehicle through an integrated electronic system that can be used in times of emergency (e.g., locked out of a car, asking for help after an accident, etc.).

**Smart Parking Apps** provide information on parking cost, availability, and payment channels. These apps are often paired with smart parking systems (e.g., SFpark). These apps include e-Parking (providing real-time information on the cost and availability of parking, parking reservations, and payment) and e-Valet (for-hire parking services where drivers use an app to dispatch valet drivers to pick-up, park, and return vehicles).

**Courier Network Services (CNS) Apps** (also referred to as flexible goods delivery) provide for-hire delivery services for monetary compensation using an online application or platform (such as a website or smartphone app) to connect couriers using their personal vehicles, bicycles, or scooters with freight (e.g., packages, food).



## APPROACH

With the growing popularity of smartphone applications, California agencies should consider several guiding principles regarding the role and implementation of smartphone apps on a transportation network.

- **Data sharing and interoperability** will form the foundation of transportation apps, particularly mobility apps. Public and private entities could play a critical role in facilitating and defining data sharing through public-private partnerships.
- **Providing open data** has allowed local governments and public agencies the ability to offer real-time transportation information to their communities, without the cost or responsibility of developing or maintaining mobile applications themselves. Public agencies should address three key areas: 1) data accessibility, 2) open licensing, and 3) data quality and timeliness.

**Data Accessibility:** Ensure that data made available are in an open format that can be downloaded, indexed, searchable, and machine-readable to allow automated processing.



**Open Licensing:** Ensure data are available to the public for use at little to no cost.

**Data Quality and Timeliness:** Ensure data are high quality and scrubbed for plug-and-play end use by developers without requiring extensive effort to make datasets usable. Data are made available as quickly as possible and frequently enough to remain current and usable.

- **Public agencies could establish data exchanges** to serve as a repository for public and private sector data sets. In doing so, public agencies should establish data standards (both data type and format); conditions for data use; and establish a data management platform to collect, securely store, and re-disseminate data to public users.

## CONCLUSIONS AND RECOMMENDATIONS

The **California Legislature should consider the following public policies and legislative agenda** pertaining to app-based transportation services:

- **Require de-identified data sharing** on trip origin and destination by all app-based transportation service providers when requested by California public agencies.
- **Establish statewide data standards and privacy protections** for all transportation apps offering information, payment, delivery, or mobility services within the State.
- **Adopt statewide privacy legislation that protects user geolocation data** and exempts these data from release under the California Public Records Act when in the possession of a public agency.
- **Amend California Civil Code § 1798.81.5 to add geolocation data** to the definition of personally identifiable information in the law requiring businesses to protect the information with reasonable and appropriate security.
- **Require plain-language opt-ins for user data sharing** between apps and service providers when required.

### References

1. Shaheen, S.; Cohen, A.; Zohdy, I; and Kock, B. (2016). *Smartphone Applications to Influence Travel Choices: Practices and Policies*. FHWA Report 16-023. U.S. Department of Transportation: Washington, D.C.

**This policy brief was generously funded by the State of California Public Transportation Account.**



# Impacts of Shared Mobility: Pooling

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## KEY TAKEAWAYS

## TOPIC/ISSUE

### Innovative Shared-Ride Services

Shared-ride services—transportation modes that allow riders to share a ride to a common destination—include various forms of ridesharing (carpooling and vanpooling); ridesplitting and taxisplitting; and microtransit. With the proliferation of smartphones and mobile Internet, it has become more convenient to share rides. Shared-ride services are having a transformative impact on many global cities by increasing vehicle occupancy through smartphone apps.

## RESEARCH FINDINGS

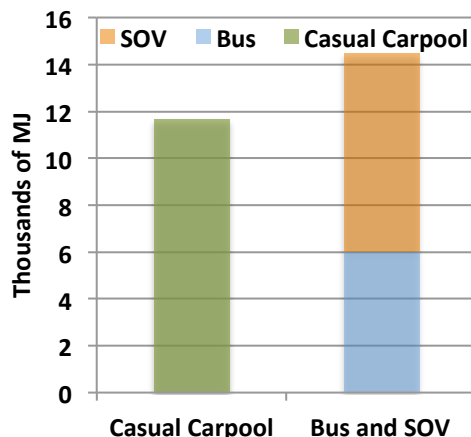
University of California, Berkeley researchers at the Transportation Sustainability Research Center (TSRC) have examined equity and shared mobility considerations in several primer projects for the US Department of Transportation (USDOT) and the California Department of Transportation (1-4).

Empirical and anecdotal evidence indicates that pooling provides numerous benefits, such as reductions in energy consumption and emissions, congestion mitigation, and reduced parking infrastructure demand; however, the precise magnitude of these impacts is not well understood (1-2).

Individually, shared-ride users benefit from shared travel costs, travel-time savings from high occupancy vehicle lanes, reduced commute stress, and often preferential parking and other incentives (1).

### Common Types of Shared-Ride Services

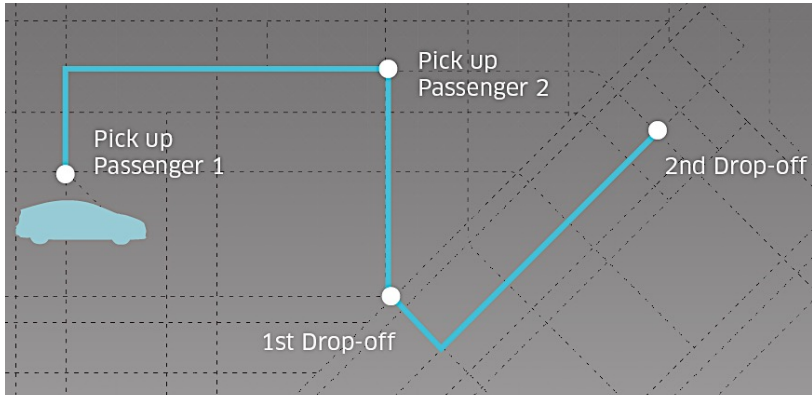
1. Ridesharing (Carpooling and Vanpooling): Ridesharing facilitates shared rides among drivers and passengers with similar origin-destination pairings. Ridesharing includes vanpooling (the grouping of seven to 15 persons commuting together in one van) and carpooling (groups less than seven passengers traveling together in one car). Services include Waze Carpool and Scoop.



MJ of energy per day for 600 people  
 Source: Minett and Pearce 2011

“Consistent definitions across a suite of shared mobility service models can guide public policy and distinguish between types of services for users.”

# RESEARCH FINDINGS (continued)



## 2. Ridesourcing/Transportation Network Companies:

Increasingly, for-hire services are offering ridesplitting (e.g., Lyft Line and UberPOOL), which match riders with similar origins and destinations together. These services typically offer a discount to passengers who express their willingness to share a ride; however, not all rides will be shared if a suitable match cannot be identified.

**3. Taxis:** In 2013, contemporary taxisplitting (shared taxi rides) was introduced by Bandwagon offering shared rides from major transportation hubs (e.g., airports, train stations, and bus terminals) in New York City. To share a taxi, waiting passengers text Bandwagon their destination (using short message services). Bandwagon compares a user's requested route with other user requests. Passengers with similar routes and destinations are paired together. Paired passengers are permitted to advance to the front of a taxi line, get into their cab, and split the fare.

**4. Microtransit:** In recent years, innovative services typically comprised of vans and buses are re-emerging offering privately owned and operated shared transportation systems. Commonly referred to as microtransit, these services can include fixed-route or flexible-route services as well as offer fixed schedules or on-demand service. Operators include Chariot and Via.



# APPROACHES IN SAN FRANCISCO BAY AREA

In the San Francisco Bay Area, commuters often use casual carpooling to get from the East Bay to downtown San Francisco during the morning commute. Using the high occupancy vehicle (HOV)



lanes of the San Francisco-Oakland Bay Bridge allows travelers to take advantage of a toll discount and shorter waits at the toll plaza. According to a 1998 survey, approximately 6,000 riders and 3,000 drivers used casual carpooling each workday morning (3). Only about nine percent of these carpoolers used ridesharing for the reverse trip in the evening; the remainder used public transportation for their return journey.



## APPROACHES (continued)

Another study estimates a reduction of 450,000 to 900,000 gallons of gasoline per year attributed to casual carpooling's congestion mitigation impact (4). A more recent study revealed that motivations to carpool include: convenience, time savings, and monetary savings, while environmental and community-based motivations ranked low (5). Shaheen et al. (2016) found that 75 percent of casual carpool users were former public transit riders compared to approximately 10 percent that previously drove alone. Casual carpooling competes with public transit due to reduced travel time (HOV lane access) and costs (typically much less expensive than comparable trips on public transit). Median wait times for casual carpooling were less than 2.0 minutes for drivers and 2.5 minutes for riders (5).

## CONCLUSIONS & RECOMMENDATIONS

**The California Legislature should consider** the following public policies and legislative agenda **pertaining to pooling systems:**

### Fill Empty Car Seats

While carpooling participation has stagnated in many parts of California, **freeway congestion is at near historic highs and public transit ridership is declining in most major cities nationwide.**

Given the constraints of public transit and highway infrastructure, **filling empty seats in cars is the quickest and most cost-effective way to provide more capacity.**

### Enhance Ridematching

The private sector may be able to **enhance ridematching by cultivating a larger match database (to establish a critical mass), integrating shared rides with other relevant traveler services.**

The private sector can also **provide a user-friendly interface via apps to remove barriers traditionally associated with carpool matching.**

### Encourage Pooled Rides

Leveraging private sector app-based services may be a cost-effective strategy for public agencies to encourage pooled rides.

To ensure faster travel times (a major incentive of pooling), **regions/local governments and the State should consider expanding access to HOV and high occupancy toll (HOT) lanes for shared-ride services, as well as dedicated curbspace for pickups/drop offs.**

#### References

1. Shaheen, S.; Cohen, A.; and Zohdy, I. (2016). *Shared Mobility: Current Practices and Guiding Principles*. FHWA Report 16-022. U.S. Department of Transportation: Washington, D.C.
2. Cohen, A. and Shaheen, S. (2016). *Planning for Shared Mobility*. Planning Advisory Service Report 583. American Planning Association: Chicago.
3. Metropolitan Transportation Commission. (1999). *Casual Carpooling 1998 Update*. Prepared by RIDES for Bay Area Commuters.
4. Minett, P., and Pearce, J. (2011). Estimating the Energy Consumption Impact of Casual Carpooling. *Energies* 4 (12): pp. 126–139.
5. Shaheen, S., Chan, N., and Gaynor, T. (2016). Casual Carpooling in the San Francisco Bay Area: Understanding Characteristics, Behaviors, and Motivations. *Transport Policy*, Volume 51, pp. 165-173 DOI: 10.1016/j.tranpol.2016.01.003.

**This policy brief was generously funded by the State of California Public Transportation Account.**

# Pooling Passengers and Services

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## TOPIC/ISSUE

### KEY TAKEAWAYS

• Shared mobility services often represent a novel use of vehicles for passenger and goods movement, but they do not benefit from many supportive policies.

• New forms of pooled services, either with distinct users sharing rides or with passenger and goods movement services bundled, support higher utilization efficiency.

• Understanding the feedback between shared mobility adoption and incentive/disincentive strategies could be key to unlocking higher vehicle occupancy.

## The Evolving Transportation Ecosystem

In the past ten years, passenger and goods movement transportation systems have evolved rapidly. Shared mobility providers are filling gaps in service and creating new markets for delivery; vehicle fleets continue to electrify; and pooled services are increasing vehicle occupancy. The uptake of innovative pooled services, as well as automation, promise to continue the trend of transformative change. As the private sector continues to advance, there is a great need for institutional flexibility in managing and coordinating all users of transportation infrastructure, particularly on the State highway network and urban arterials.

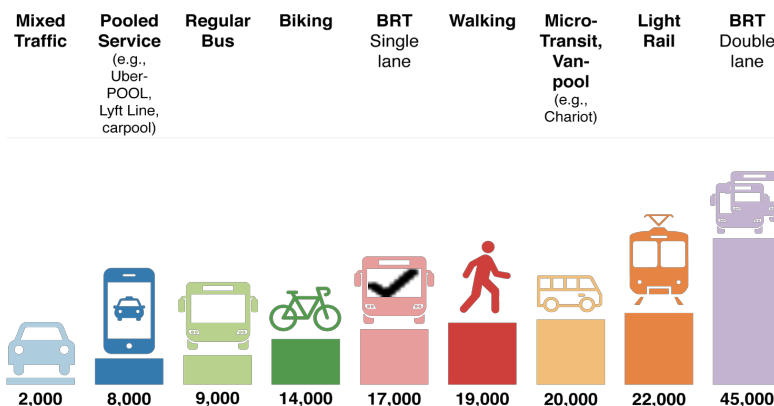
Recently, political will has shifted, with policymakers demonstrating interest in exploring more adaptive forms of current transportation user fees, along with innovative funding mechanisms via partnerships. Additionally, private mobility providers have expressed interest in direct user fees and incentivizing higher occupancy travel (e.g., Lyft, Uber, trucking industry). However, planners and policymakers currently do not have a method for distinguishing between private vehicles and shared services when envisioning the current and future transportation ecosystem. As such, investigations into how pioneering services will interface with access to rights-of-way and pricing strategies is critical as we plan for and adapt in the future.

## RESEARCH FINDINGS

As new forms of shared services mature, and others develop, it is important to understand how these modes differ from current ones. Only with complete information can decision makers develop comprehensive strategies that can target specific outcomes.

**Corridor maximum capacity of urban transport modes**  
 [persons per hour in both directions]

Source: GIZ, TU Delft, and author's calculations



Maximum corridor capacity calculations for the pooled service, microtransit, and vanpool categories use a linear scaling factor based upon passenger capacity (i.e., four passengers for every five seats in a sedan; 12-14 passengers for every 15 seats in a larger van). These vehicles can maneuver similarly to a standard sedan in mixed traffic; however, researchers remained conservative given pick-up and drop-off times.

“Investigations into how pioneering services will interface with rights-of-way access and pricing strategies is critical as we plan for, and adapt in the future.”



# APPROACH

UC Berkeley researchers employed primary source analysis, literature reviews, and expert interviews to develop a suite of potential policy strategies at local, State, and Federal levels. Examples include fixed fees, access tolls, sales taxes, excise taxes, mileage-based user fees, and prioritized access to curb space and parking, among others. Using network models and sample populations, the effects of each policy or combination of policies on the transportation ecosystem are analyzed, as applicable. Using cost-effectiveness analyses, the long-term sustainability and efficiency of the policies are examined using potential future scenarios (e.g., increased occupancy, electric drive vehicle adoption, automated/connected vehicle adoption, cleaner internal combustion engine standards, etc.).

# CONCLUSIONS AND RECOMMENDATIONS

Once a clearer picture of the transportation ecosystem is developed, stakeholders will be empowered to craft targeted policy to move California toward its future environmental and societal goals. At present, our research has shown:

- Private industry stakeholders from the goods movement and shared mobility sectors have expressed interest in pricing strategies (e.g., Lyft, Uber, trucking industry).
- Re-distribution of collected funds via innovative pricing mechanisms is an issue that stakeholders currently do not agree upon.
- At present, long-term revenue viability is a goal for public agencies.
  - This could lead to short-sighted solutions, if we do not account for future changes in traveler behavior.
- Prioritizing infrastructure access for more efficient transportation modes should be a priority.
- For goods movement, infrastructure access policies that emphasize efficiency can decrease externalities in urban areas (double parking, congestion, idling, etc.), particularly due to the lower elasticity of demand to delivery fees.
- Understanding the required data format to produce results is important when structuring partnerships and evaluation strategies.

Due to the long time horizon, and many uncertainties involved in phasing in access and pricing policies, there is an opportunity to develop more flexible policies. The table below presents a framework for prioritizing access based upon vehicle occupancy, type, and propulsion. Curb and access policies are more suited to a local scale, as the built environment greatly influences outcomes, whereas pricing strategies could be instituted at both State and local/regional scales. Partnerships with mobility providers via pilot projects could provide beneficial empirical data and understanding.

	Vehicle Type		Vehicle Propulsion		Vehicle Occupancy	
Curb/Parking Access	Car:	Low	Internal Combustion:	Low/None	20%	Low
	Bus:	High	Natural Gas:	Low	40%	Med.
	Light-Rail:	High	Hybrid:	Medium	60%	Med.
	Bike/Walk:	High	Electric:	High	80%	High
	Medium-Duty Vehicle:	Med.	Fuel Cell:	High	100%	High
	Heavy-Duty Vehicle:	Med.				
	Shuttle:	Med.				
Pricing	Car:	\$\$\$\$	Internal Combustion:	\$\$\$\$	20%	\$\$\$\$
	Bus:	\$	Natural Gas:	\$\$\$	40%	\$\$\$
	Light-Rail:	\$\$	Hybrid:	\$\$	60%	\$\$
	Bike/Walk:	Free	Electric:	\$	80%	Free
	Medium-Duty Vehicle:	\$\$\$	Fuel Cell:	\$	100%	Free
	Heavy-Duty Vehicle:	\$\$\$				
	Shuttle:	\$				

**Potential Access and Pricing Policy Framework**

*This policy brief was generously funded by the State of California Public Transportation Account.*

# Road Usage Charging (RUC)

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## KEY TAKEAWAYS

## TOPIC/ISSUE

### Shared Mobility and RUC

• Direct transportation users fees are well studied and have been implemented both in the U.S. and worldwide.

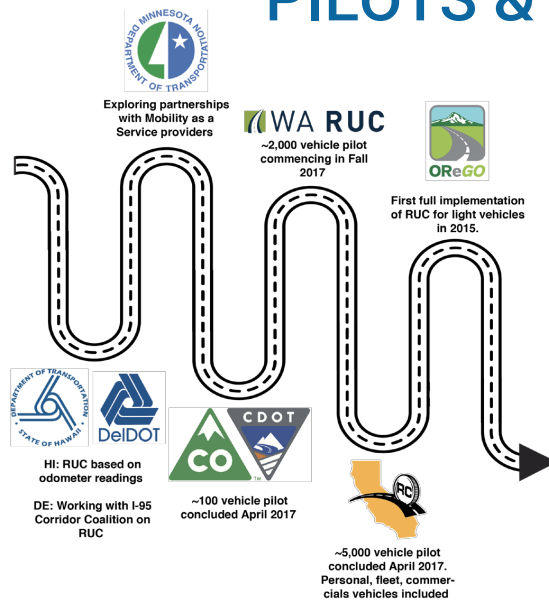
• RUC, a form of direct user fees, is gaining momentum at the state and federal levels.

• RUC is one of a few options to create sustainable infrastructure funding sources in a fast-changing transportation future.

• Shared mobility provides a unique partnership opportunity for RUC provision.

Pricing transportation infrastructure, either to achieve a desired outcome or to raise revenue, is a concept dating back to early- and mid-20<sup>th</sup> century economics and transportation scholarship. Different approaches to pricing (e.g., area-wide pricing, vehicle miles traveled, express lanes, etc.) have been adopted in parts of Europe and Asia; some strategies cover all road users, some only passenger vehicles, and others only commercial and goods movement vehicles. Pricing, as a revenue source, has recently gained momentum in the U.S., driven by federal legislation (MAP-21; FAST Act) and state-run pilot programs (CADOT, ODOT, MNDOT, CODOT, WADOT). As local, state, and federal agencies seek to use pricing to create sustainable revenue sources, practitioners must consider current and future shared mobility modes and partnerships.

## PILOTS & SHARED MOBILITY



**Recent advancements in RUC by U.S. States**

“RUC offers promising opportunities for agencies to move beyond funding for roadway and public transit infrastructure and to use direct user fees to achieve positive societal outcomes.”

Based upon ongoing pilot monitoring, academic work on the topic, and other literature, we highlight topics of interest as the pilot programs produce data sets for analysis.

### Pricing Structures

- Pilot programs and shared mobility offer unique opportunities to investigate the behavioral effects of dynamic and/or tiered pricing structures.
- Minnesota is seeking to study distance-based fees with shared mobility services.
- How should pricing be determined? Pricing structures will likely be different for personal, for-hire, and commercial travel/goods movement.
  - Differences can include: revenue vs. non-revenue service, occupancy, vehicle weight classes, etc.

# PILOTS & SHARED MOBILITY

## User Interface & Experience

- States have examined different payment collection technology in pilot programs:
  - Pay at the pump, account managers (location enabled and disabled), time and/or mileage permits
- Payment and pricing structures can have notable impacts on a user's ability to pay, particularly for those who pay a higher percentage of income toward travel.
- Understanding public perceptions of RUC as a funding mechanism compared to the gas tax, before, during, and after the pilot will illuminate opportunities and barriers.
  - User perception of privacy protection appears to increase with system exposure.

## Partnerships

- Account managers often serve as intermediaries (similar to the main payees of the fuel excise tax), which can reduce transaction costs related to collection.
  - However, the fuel excise tax is currently still cheaper to collect due to the small number of payers.
- Some states, like Minnesota, are investigating partnerships with shared mobility providers (e.g., Lyft, Uber) to serve as revenue collectors.
  - This structure could allow additional flexibility, if adapted in a similar fashion as to the account manager agreements.

# MOVING FORWARD

RUC is in its infancy in the U.S., but it offers promising opportunities to move beyond traditional infrastructure funding to use direct user fees to achieve positive societal outcomes. By employing data-driven policy development, procedural and group equity can be maintained, sustainable revenue sources can be established, and pricing can be used as a mechanism to move the country toward a more efficient future.

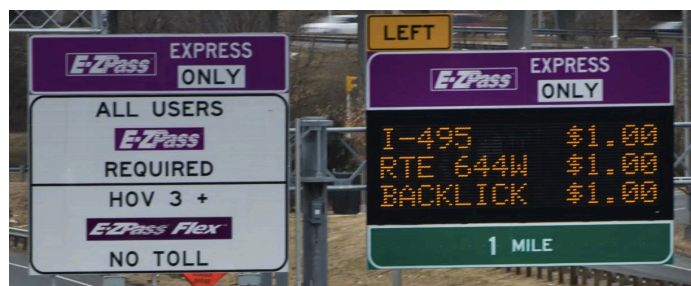


Image courtesy of Linda Davidson/The Washington Post

## Some of the key issues include:

- Institutional reform and legal barriers to RUC
  - California vehicle code 3.6.3 9400.8 prohibits assessing new charges for use of existing streets and roads.
  - In California, Proposition 26 requires a supermajority to pass new taxes or fees.
  - Other legal barriers include incorporating a new tax into future revenues and phasing out an existing tax.
- Governance reform and partnerships
  - Interstate, Federal-state, and State-regional jurisdictional issues should be resolved.
  - Partnerships with private information and shared mobility providers should be investigated to maximize efficiency and ensure optimal system control.
  - Public agencies need to develop resources to enable spatio-temporally dynamic RUC.
- Public participation and input is key for determining possible equity implications and for ensuring procedural equity.

***This policy brief was generously funded by the State of California Public Transportation Account.***

# Equity and Shared Mobility

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## KEY TAKEAWAYS

- Shared mobility impacts everyone, not just users. Because of its impacts on the transportation network and the environment, shared mobility affects an entire community, particularly at the local and regional level.
- Transportation should be accessible and equitable.
- Public agencies should ensure social, interregional, and intergenerational equity to meet the basic transportation needs of travelers.

“Public participation is key ...to inform and involve the public in planning processes and to listen to the public’s needs in considering shared mobility services.”

## TOPIC/ISSUE

### Innovative Shared-Ride Services

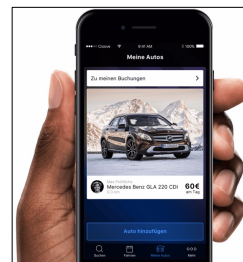
Ensuring equal access for protected classes impacted by shared mobility services is critical. In California, this can include provisions mandating access for individuals with disabilities, as well as prohibitions in discrimination against other protected classes. Many of these laws not only prohibit discrimination against the end user but also shared mobility employees. In addition to prohibiting discrimination, it is imperative to ensure shared mobility is accessible to all. Equitable treatment of shared mobility providers (e.g., data, insurance, licensing) is also a key consideration.

## RESEARCH FINDINGS

University of California, Berkeley researchers at the Transportation Sustainability Research Center (TSRC) have examined equity and shared mobility considerations in several primer projects for the US Department of Transportation (USDOT) and the California Department of Transportation (1-4).

UC Berkeley TSRC studies of shared mobility and equity revealed three primary areas of focus for lawmakers (although additional equity areas may also need to be addressed) (1-4). These include:

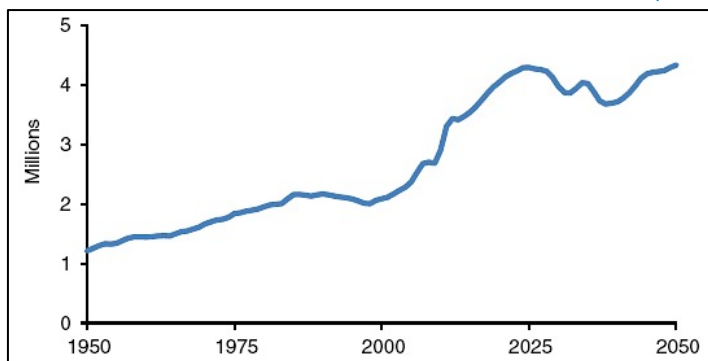
- **Bridging the Digital Divide:** Mobility consumers are becoming increasingly dependent on smartphone hardware and applications, but the data packages required are often expensive. Further, apps can be challenging to use for older adults and others that have not adopted smartphones.
- **Underbanked and Unbanked Users:** Smartphone apps with a payment component may not serve the needs of unbanked users (typically lower-income households). Many smartphone apps generally require payments facilitated through credit/debit cards or mobile/Internet banking. If a user is unbanked (does not have a bank account or a credit/debit card), app-based services with a payment component (e.g., electronic fares and ticketing) may be difficult or impossible to use. This can exclude households that do not have credit cards or bank accounts due to insufficient funds, bad credit history, etc.



Year	Number of Households (millions)	Unbanked (Percent)	Underbanked (Percent)
2011	120.4	8.2	20.1
2013	123.7	7.7	20.0
2015	127.5	7.0	19.9

National Estimates, Household Banking Status by Year Source: Federal Deposit Insurance Corporation 19

## RESEARCH FINDINGS (CONTINUED)



Number of people turning 65, 1950–2050

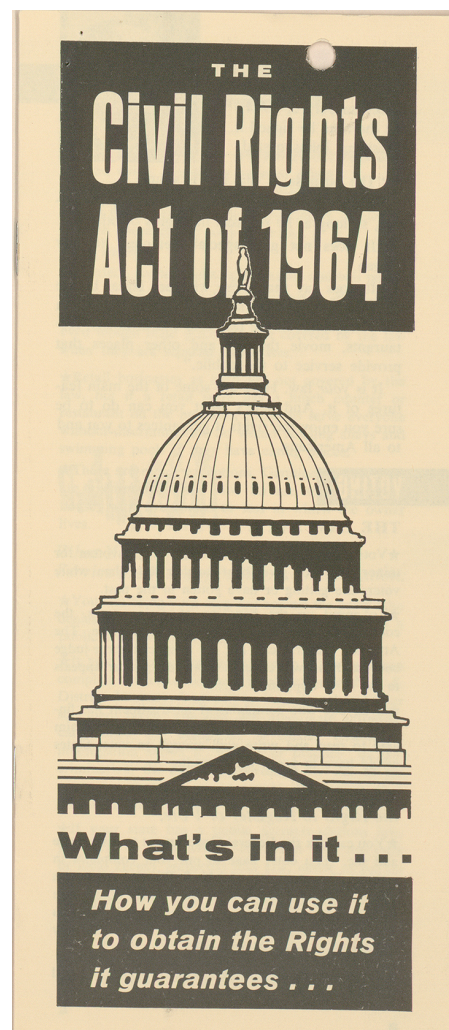
Source: *Institute of Medicine*

- Serving Passengers with Special Needs:** Older adults and passengers with disabilities requiring special assistance (e.g., acceptance of service animals, wheelchair access, walkers, etc.) may have difficulty locating, driving, and/or dispatching services that accommodate their needs.

## APPROACH

A number of laws and regulations have been implemented to ensure access and prohibit discrimination in the transportation sector:

- Title VI of the Civil Rights Act of 1964:** This law prohibits discrimination based on race, color, and national origin in programs and activities that receive federal financial assistance.
- Civil Rights Restoration Act of 1987:** This law clarifies the earlier definition of “programs and activities” in other civil rights legislation. Under this law, discrimination is prohibited throughout an entire organization or agency, if any part of that agency receives federal financial assistance.
- Title 49 CFR Part 21:** This regulation implements provisions of Title VI for any program or activity receiving federal financial assistance from the USDOT.
- Title 49 CFR 37.105:** This regulation implements equivalent service provisions with the respect to schedules/headways; response time; fares; geographic area of service; hours and days of service; availability of information; reservations capability; constraints on capacity and service availability; and restrictions based on trip purpose.
- National Environmental Policy Act (NEPA):** Under NEPA, an environmental impact statement (EIS) is used by federal agencies to ensure a full and fair discussion of all significant environmental impacts of projects occurs and informs decision makers and the public of reasonable alternatives that would avoid, minimize, or mitigate the adverse impacts or enhance the quality of the human environment.





## APPROACH (CONTINUED)

- **The Rehabilitation Act of 1973:** Section 504 makes it illegal for federal agencies, programs, or activities that receive federal financial assistance to discriminate against qualified individuals with disabilities. Section 508 requires federal information technology and electronic systems be accessible to people with disabilities.
- **Americans with Disabilities Act (ADA):** This law prohibits discrimination against people with disabilities. Title III of ADA requires that private transportation businesses provide accessible-ready vehicles and facilities to persons with disabilities.
- **The California Environmental Quality Act (CEQA):** modeled answer NEPA, offers additional protections (e.g., when a public agency implements shared mobility programs).

## CONCLUSIONS & RECOMMENDATIONS

The California Legislature should consider the following public policies and legislative agenda pertaining to app-based transportation services:

**The Unruh Civil Rights Act** prohibits discrimination against protected classes and guarantees the right to full and equal accommodations, advantages, facilities, privileges, or services in all business establishments (Civ. Code, §§ 51, 51.5, 51.6).

The Legislature should consider expanding the definition of “business establishments” to explicitly include **transportation service providers**. Other state and local civil and human rights laws may offer additional protections.

**The Disabled Persons Act** protects Californians from discrimination based on disability. California’s law states that individuals with disabilities shall be entitled to “full and equal access, as other members of the general public” to the “privileges of all common carriers, airplanes, motor vehicles, railroad trains, motorbuses, streetcars, boats, or any other public conveyances or modes of transportation (whether private, public, franchised, licensed, contracted, or otherwise provided).” There should be **more education and outreach to service providers**, coupled with **enforcement by the Office of the Attorney General (OAG)**, to ensure that private transportation service providers are providing full and equal access to all protected classes (Civ. Code, §§ 54.1).

### References

1. Shaheen, S.; Cohen, A.; and Zohdy, I. (2016). *Shared Mobility: Current Practices and Guiding Principles*. FHWA Report 16-022. U.S. Department of Transportation: Washington, D.C.
2. Shaheen, S.; Cohen, A.; Zohdy, I.; and Kock, B. (2016). *Smartphone Applications to Influence Travel Choices: Practices and Policies*. FHWA Report 16-023. U.S. Department of Transportation: Washington, D.C.
3. Cohen, A. and Shaheen, S. (2016). *Planning for Shared Mobility*. Planning Advisory Service Report 583. American Planning Association: Chicago.
4. Shaheen, S.; Bell, C.; Cohen, A.; and Yelchuru, B. (2017). *Travel Behavior: Shared Mobility and Transportation Equity*. FHWA Report 18-007. U.S. Department of Transportation: Washington, D.C.

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