



REPORT

LOS ANGELES SHARED-MOBILITY CLIMATE AND EQUITY ACTION PLAN

REPORT PREPARED BY: NRDC AND NUTTER CONSULTING



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The following action plan and policy framework build off the ideas included in the Shared Mobility Action Plan for Los Angeles County released by the Shared-Use Mobility Center (SUMC) in September 2016. This report endorses many of the concepts in that foundational document, and breaks new ground with a specific focus on policies to ensure shared-mobility advances climate and equity goals.



About NRDC

The Natural Resources Defense Council is an international nonprofit environmental organization with more than 3 million members and online activists. Since 1970, our lawyers, scientists, and other environmental specialists have worked to protect the world's natural resources, public health, and the environment. NRDC has offices in New York City, Washington, D.C., Los Angeles, San Francisco, Chicago, Montana, and Beijing. Visit us at nrdc.org.

The Healthy People and Thriving Communities program at NRDC advances strategies create the strong, just and resilient communities that provide solutions to climate change.

ABOUT THE CITY OF LOS ANGELES DEPARTMENT OF TRANSPORTATION

LADOT leads transportation planning, design, construction, maintenance, and operations in the City of Los Angeles. It works together and partners with other agencies to provide safe, accessible transportation services and infrastructure in the city and region.

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Executive Summary



Technology-enabled shared mobility options are revolutionizing how our cities move. It took Uber just six years to match the market valuation of General Motors, which has been around since the early 20th century. It is now estimated that there are seven trips taken in Lyft or Uber for every ten transit trips in the United States. The growth curve mapping the global rise of bike sharing systems can only be described as exponential. The potent combination of technology-enabled mobility, near ubiquitous smartphone availability, and a new openness to collaborative consumption through the rise of the sharing economy portends new and exciting possibilities for cities.

We know these travel modes are growing in popularity. What is less clear is what their impacts are on the environment, and how accessible these new tech-enabled mobility options are to all travelers. This report presents a first of its kind policy framework for how shared mobility can better help cities reach their climate and equity goals—and offers a role for city government in shaping this emerging mobility marketplace.

Because of Los Angeles’ leadership on sustainability, transit expansion, and social equity, the city presents an interesting and apt context for developing such a framework. Long an icon of car culture and urban sprawl, Los Angeles is now innovating its way to a more sustainable and equitable mobility future. In fact, contrary to popular belief, the Los Angeles region carries 1.3 million daily trips on public transportation, which ranks third in the nation behind New York City and Chicago.¹

To inform the Los Angeles framework, we drew on the best available research on the impacts of shared mobility, as well as best practices from around the world. Our policy recommendations seek to promote and leverage

the best aspects of shared-mobility services (such as the potential to reduce reliance on private vehicles) as well as to mitigate new challenges (such as the undermining of our core transit services and creation of new traffic congestion). Our policies can help Los Angeles leverage aspects of shared mobility as a tool to address climate change and understand how to make transportation services more equitable.

We considered the current understanding of shared mobility and best practices from around the world as well as the city’s existing targets and goals. We then distilled six core recommendations to advance climate and equity outcomes from shared mobility. We highlight our recommendation for the City’s first action in each category below, but the chapters that follow contain significantly more detail in each area.

Adhering to these six core recommendations will not only put Los Angeles on a path to achieve better climate and equity outcomes from shared mobility, it will also help to pilot solutions to urban mobility challenges and create an important model for dozens of other cities to follow.

<hr style="border: 1px solid #00AEEF; margin-bottom: 10px;"/> <h1 style="font-size: 2em; color: #00AEEF; margin: 0;">1.</h1> <p style="text-align: center; font-weight: bold; margin: 0;">EMBED EQUITY OUTCOMES</p> <hr style="border-top: 1px dashed #00AEEF; margin: 5px 0 5px 0;"/> <p style="margin: 0;">Design shared-mobility programs and policies with and for underserved, low-income communities.</p> <p style="margin: 0;">FIRST ACTION: Create an equity advisory committee to provide greater input into city decision making.</p>	<hr style="border: 1px solid #00AEEF; margin-bottom: 10px;"/> <h1 style="font-size: 2em; color: #00AEEF; margin: 0;">2.</h1> <p style="text-align: center; font-weight: bold; margin: 0;">REINFORCE TRANSPORTATION PRIORITIES IN STREET DESIGN</p> <hr style="border-top: 1px dashed #00AEEF; margin: 5px 0 5px 0;"/> <p style="margin: 0;">Manage city assets to prioritize walking, biking, public transit, and shared mobility over private vehicles.</p> <p style="margin: 0;">FIRST ACTION: Reduce or eliminate minimum parking requirements in the zoning code.</p>	<hr style="border: 1px solid #00AEEF; margin-bottom: 10px;"/> <h1 style="font-size: 2em; color: #00AEEF; margin: 0;">3.</h1> <p style="text-align: center; font-weight: bold; margin: 0;">ELECTRIFY VEHICLES AND INFRASTRUCTURE</p> <hr style="border-top: 1px dashed #00AEEF; margin: 5px 0 5px 0;"/> <p style="margin: 0;">Electrify shared-mobility fleets and install ubiquitous charging infrastructure.</p> <p style="margin: 0;">FIRST ACTION: Create incentives for use of EVs in carshare, vanpool, rideshare, and ridesource.</p>	<hr style="border: 1px solid #00AEEF; margin-bottom: 10px;"/> <h1 style="font-size: 2em; color: #00AEEF; margin: 0;">4.</h1> <p style="text-align: center; font-weight: bold; margin: 0;">DESIGN SEAMLESS TECHNOLOGY SYSTEMS</p> <hr style="border-top: 1px dashed #00AEEF; margin: 5px 0 5px 0;"/> <p style="margin: 0;">Create seamless and widely accessible transit rider information systems, including payments and real-time transit data.</p> <p style="margin: 0;">FIRST ACTION: Create a single routing, booking, and payment platform to enable access to all mobility options.</p>	<hr style="border: 1px solid #00AEEF; margin-bottom: 10px;"/> <h1 style="font-size: 2em; color: #00AEEF; margin: 0;">5.</h1> <p style="text-align: center; font-weight: bold; margin: 0;">ACQUIRE DATA TO BETTER MANAGE THE PUBLIC REALM</p> <hr style="border-top: 1px dashed #00AEEF; margin: 5px 0 5px 0;"/> <p style="margin: 0;">Require that shared-mobility providers and the city exchange data.</p> <p style="margin: 0;">FIRST ACTION: Develop specifications for gathering data from mobility providers.</p>	<hr style="border: 1px solid #00AEEF; margin-bottom: 10px;"/> <h1 style="font-size: 2em; color: #00AEEF; margin: 0;">6.</h1> <p style="text-align: center; font-weight: bold; margin: 0;">ENACT SYSTEMIC POLICIES</p> <hr style="border-top: 1px dashed #00AEEF; margin: 5px 0 5px 0;"/> <p style="margin: 0;">Design system-wide shared-mobility policies and programs to enable the best environmental and social performance from all shared-mobility modes.</p> <p style="margin: 0;">FIRST ACTION: Pilot a Go Zone to manage congestion and create a sustainable funding source for low-carbon mobility choices.</p>
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Los Angeles's Challenge and Opportunity



With a population of 3.9 million, Los Angeles is the second largest city in the United States, spread over 468 square miles. By 2040, the population is projected to increase 15 percent to 4.6 million.¹ In 2016, Los Angeles had the worst traffic congestion in the nation. The average motorist found themselves stuck in traffic for 104 hours each year, or the equivalent of more than two weeks' vacation. Still, that figure is projected to increase.² Ironically, 47 percent of all trips within the city are less than three miles long, a distance that could easily be covered by walking, biking, public transit, scooters, or shared rides.

As the city's population continues to grow, it will need more varied mobility options. Younger generations are already seeking such alternatives to owning automobiles and to driving. Historically neglected populations, particularly low-income residents, need improved transportation options to ensure that they can take part in economic and social opportunities. Children, the disabled, and the aging population will especially need greater access to safe and viable transportation options.³ In fact, 13.5 percent of Los Angeles households have no access to a car at all.

GREENHOUSE GAS EMISSIONS AND POLLUTANTS

Los Angeles has pledged to reduce its emissions consistent with a goal of keeping global warming below 1.5 degrees Celsius. According to the city's 2013 carbon emissions inventory, the transportation sector produces 34 percent of Los Angeles's greenhouse gas emissions, second only to the City's imported electricity from coal-fired power plants.⁴ Conventional gas- and diesel-fueled transportation sources emit four of the six greenhouse gases that endanger public health.⁵ Cars, trucks, ships, and airplanes emit 90 percent of the region's local air pollutants, including ozone and particulate matter, that lead to respiratory diseases like asthma and bronchitis, and increased cancer risk.⁶ It should, then, come as no surprise that the Los Angeles region also has the worst air quality in the country. As such, low-carbon mobility solutions are critical.

The Los Angeles 2015 Sustainable City pLAN aims to eliminate the number of days that do not meet federal healthy air standards by 2035. The pLAN also aims to reduce the city's greenhouse gas emissions by 45 percent by 2025, 60 percent by 2035, and 80 percent by 2050, all based on 1990 levels. Reducing single occupancy vehicle trips will be critical to meeting Los Angeles's targets. Therefore, the pLAN calls for reducing daily vehicle miles traveled per capita by 5 percent by 2025 and 10 percent by 2035, as well as to increasing shared transportation trips to 5 percent and trips taken by walking, biking, and public transit to 50 percent by 2035. Our recommendations are designed to help the city meet these ambitious targets.



CLIMATE CHANGE AND SEA LEVEL RISE IMPACTS

Global warming is causing sea levels to rise at an alarming rate. In Los Angeles, sea levels are projected to increase by up to two feet by 2050 and up to 5.6 feet by 2100.^{7,8} The resulting flooding is predicted to cause severe damage to roads, utilities, and other infrastructure. That damage will, in turn, disrupt transportation, the energy supply, and the availability of clean water. Lower-income residents have fewer resources to prepare for or respond to emergencies, and are thus likely to be disproportionately affected.⁹ Low-carbon mobility options will reduce greenhouse gas emissions, which will help to mitigate dangerous climate change. These options will also increase resilience by providing multiple transportation choices in the event of severe weather and flooding.

EQUITY AND ACCESS TO TRANSPORTATION

In a healthy, diverse, vibrant, and socially just city, all citizens should have access to safe, affordable, and convenient modes of travel. Shared-mobility services can enhance mobility options for currently underserved populations. However, presently these groups may have limited access to shared mobility for a number of reasons.

New mobility services often require a credit card, bank account, Internet access, or a smartphone. Approximately 8 percent of U.S. households, predominantly low-income families, lack bank accounts. Also, 36 percent of Americans do not own smartphones. That figure increases to 50 percent among those earning less than \$30,000 annually and 73 percent for senior citizens.¹⁰ In Los Angeles, over 90 percent of Metro riders own a cell phone, and 40 percent of riders have a smartphone. Just 7 percent of riders own neither.¹¹ According to the Shared-Use Mobility Center, of the major U.S. cities, Los Angeles's low-income residents have among the most limited access to car and bikeshare programs. In fact, access is only lower in Houston and Buffalo.¹²

A 2015 Los Angeles County survey shows an average household income of \$14,876 for bus users, compared with \$55,909 for the county as a whole.

Los Angeles in the Lead for Shared-Mobility and Public Transportation

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Los Angeles has already made strong commitments to sustainability and innovation. The city is already hard at work on the largest transit infrastructure improvement program in the United States. In fact, 21,036 green jobs were created in Los Angeles by January 2017. The city is on track to reach 75,000 green jobs by 2025. In addition, as of January 2017, the city had installed 1,390 publicly accessible EV chargers, including 45 DC fast chargers (which provide a 60- to 80-mile range from a 20-minute charge).¹³ That's more EV infrastructure than any other U.S. city.¹⁴

The Sustainable City pLAN proposes to convert the entire municipal fleet to EVs by 2035, and Metro adopted a policy of electrifying its fleet of 2,200 buses by 2030. LADOT also has a goal of 100 percent EV buses by 2030 and will electrify 320 buses. The City of Los Angeles Mobility Plan aims to site a shared-use vehicle within a half mile of 75 percent of households, and access to bicycle-sharing within a quarter mile of 50 percent of households – all by 2035. The plan calls for active transportation funding as well as funding for multimodal infrastructure projects. It also requires non-ownership models for vehicle mobility, feeder bus services for local neighborhoods, and shuttle bus programs.

COMMERCIAL SHARED-MOBILITY SNAPSHOT

Many urban dwellers are car shedding, or opting out of vehicle ownership. Millennials, in particular, are 29 percent less likely to buy a car than Generation Xers.¹⁵ They are largely driven away from driving by the hassles and costs of purchasing, parking, maintaining, repairing, and fueling a vehicle. A subset of Millennials further cite concerns about climate change.¹⁶ Instead of cars, they're choosing shared mobility and public transit.

Since the launch of bike sharing in the 1990s, there are now more than 125 programs in the country and close to 1,000 worldwide, sharing one million bicycles.¹⁷ A 2015 report projects that the global bike-share sector will be worth \$6.3 billion by 2020. By July 2015, car sharing organizations in the United States had grown to more than 1.6 million members from just over 100,000 in 2006. The overall car sharing fleet has increased from 3,300 cars in 2006 to 25,000 in 2014.¹⁸ In 2016, an estimated 15 million Americans used ridesourcing apps, such as Uber and Lyft, and 104 U.S. cities had bike sharing systems. In 2016, there were 27 Mobility on Demand (MOD) partnerships, which are local partnerships that

expand and support multimodal transit services. These partnerships between public and private entities provide funds through the \$8 million federal Department of Transportation Sandbox grant to projects aimed at the DOT's Mobility on Demand Sandbox program. MOD hopes to improve public transportation through mobility tools and technology to make transportation systems more efficient and accessible.^{19,20}

Microtransit, a form of on-demand, dynamically-routed transit, started to emerge in US cities starting in 2012. Some early entrants into the microtransit field have already folded. Current microtransit operators include Chariot in New York, Austin, Seattle, and San Francisco. Via operates in Chicago, New York, and Washington while Chariot is planning major expansion to additional markets in 2017. The Los Angeles County Metropolitan Transportation Authority and LADOT are both developing a curb-to-curb microtransit service as a partnership with the private sector.^{21,22,23,24,25}

In 2011, Uber launched real-time, smartphone-driven ridesourcing in San Francisco. Other transportation network companies (TNCs) like Lyft and Sidecar rolled out in 2012. There are now more than 15 ridesourcing companies in the United States. Lyft and Uber are the most popular and operate in many cities around the world, including most major U.S. cities. In December 2016, Uber reported 78 million trips in the United States and Lyft reported 18.7 million. As of 2016, Uber claims to hold 84 to 87 percent of the U.S. market share, while Lyft claims about 20 percent. The rest of the market is split between smaller services such as Curb, and even smaller localized companies like Wingz in Los Angeles.

Traditional auto manufacturers have also recently entered the shared-mobility market. In 2016, General Motors launched a carshare subsidiary called Maven and invested \$500 million in Lyft to test a fleet of self-driving Chevrolet Bolt electric taxis. Daimler similarly created a carsharing company called car2go. The company also formed a mobility services subsidiary, Moovel Group, which acquires transportation-related app startups. So far, its portfolio includes route planner RideScout, taxi-booking app Mytaxi, and mobile ticketing app GlobeSherpa.

CHALLENGES AND OPPORTUNITIES

Researchers and policymakers are working to understand whether new shared-mobility services will complement or compete with existing sustainable transportation choices such as public transit, walking, and cycling. In certain cases, shared mobility can pick up where public transit leaves off with first- and last-mile connections, essentially getting a passenger to and from the bus or train stop.

In theory, because they provide access to a vehicle without the need for ownership, carsharing and ridesharing services also complement transit. This makes travelers more likely to use public transit and to walk and bike. Yet researchers have documented that services like Uber and Lyft are, in fact, competing with traditional public transit. A 2017 University of California, Davis study of major U.S. cities found that individuals who started using ride-hailing services decreased their use of buses by 6 percent and light rail by 3 percent between 2014 and 2016.²⁶ An examination of the New York City transit system found a slowdown in the growth of bus and subway ridership concurrent with the rapid growth of Lyft and Uber in that city.²⁷

A critical policy question is whether city policy goals of equity, livability, and climate are being served if for-profit shared-mobility services erode public transit ridership. To avoid this, regulations and street design changes should help to prioritize and protect core transit investments.

City agency officials and policymakers have a unique and vital role in the shared-mobility ecosystem. Proactive engagement in the design and implementation of shared-mobility policies and programs can help to ensure positive environmental and societal outcomes. Shared mobility offers the potential for, but not the certainty of, a number of environmental, social, and economic benefits.²⁸ Without thoughtful policy, shared mobility services could increase greenhouse gas emissions and congestion, and reduced transit access for already underserved communities. If our streets become clogged with zero occupancy autonomous vehicles that are powered by fossil fuels, for example, we will be headed in the wrong direction.

The Policy Framework and Action Plan

We considered the current understanding of shared mobility and best practices from around the world and distilled six core principles that we recommend as the action plan for policymaking to advance climate and equity outcomes from shared mobility.

EMBED EQUITY OUTCOMES

Design shared-mobility programs and policies with and for underserved, low-income communities.

REINFORCE TRANSPORTATION PRIORITIES IN STREET DESIGN

Manage city assets to prioritize walking, biking, public transit, and shared-mobility, not private vehicles.

ELECTRIFY VEHICLES AND INFRASTRUCTURE

Electrify shared-mobility vehicles and develop ubiquitous EV charging infrastructure.

DESIGN SEAMLESS TECHNOLOGY SYSTEMS

Create seamless and widely accessible transit rider systems, including payments and real-time transit data.

ACQUIRE DATA TO BETTER MANAGE THE PUBLIC REALM

Require data exchange between shared-mobility providers and the city.

ENACT SYSTEMIC POLICIES

Design systemwide shared-mobility policies and programs to enable the best environmental and social performance from all shared-mobility modes.

EMBED EQUITY OUTCOMES

Work with local leaders to design shared-mobility programs and policies, and solicit iterative input to maximize community benefit.

Policymakers should build on existing partnerships and explore new ones with nonprofit organizations, community groups, and others who serve communities in need. Policymakers should strengthen and expand their focus on equity and institutionalize community engagement by deploying the strategies below.

Prioritize community engagement and crowdsource shared-mobility location preferences and increase overall access.

1. Develop guidelines for gathering and responding to community input.

2. Implement guidelines for designating pickup and drop-off locations for taxis and Transportation Network Companies.
3. Continue using online voting via crowdsourcing for any bikeshare expansion plans.
4. Continue to provide offline voting options for bikeshare and carshare pickup zones such as in-person surveys and workshops for those who lack Internet access. Offer community voting on locations for carshare spots along the curb and for any ride-hailing pickup or drop-off zones including for taxis where feasible.
5. Bring the online process of membership sign-ups for bikeshare and carshare to residents without Internet access through interactive kiosks, pop up events, and other analog strategies such as paying through community-serving activity centers and vendors.

Leverage shared mobility as a pathway for employment and economic opportunity.

1. Offer discounts to create opportunities for job seekers to use shared-mobility modes to gain access to employment opportunities not well served by public transit.
2. Encourage the use of bike share or other shared-mobility programs as a path to employment and workforce development by creating jobs and training opportunities for local low-income and marginalized residents in partnership with bikeshare operators.
3. Working with job training centers, provide access to employment and job training in bike repair, car maintenance, and EV charger maintenance, for example.

JOB CREATION IN TARGET NEIGHBORHOODS (ATLANTA, GA)

With a Better Bike Share grant, Relay Bikeshare hired ten bikeshare ambassadors from targeted low-income neighborhoods through the Atlanta Bike Champions program. These ambassadors will do outreach and serve as advocates for the bikeshare program in their communities. They will receive paid training and work as well as access to a pipeline for future employment opportunities, in line with the city's goals to bring more workforce development to the Westside. The program grant also helps support local community bike partner organizations.²⁹

Initiate research projects to determine needs, test solutions, and establish metrics for low-income mobility needs.

1. Pilot research projects, using surveys and focus groups, within low-income communities to ensure needs are well understood and baseline data for equity metrics are determined.
2. Work with TNCs, dockless bike share services, and microtransit services to identify geographic equity-related goals and develop new goals as needed.

Accept cash payments and subsidize or significantly discount bikeshare memberships for low-income communities.

1. Reduce annual membership costs for lower-income resident and give individuals cash payment options to local activity centers.

Incentivize TNCs and bikeshare and carshare providers to operate in underserved, low-income areas.

1. Establish shared-mobility service (bikeshare, carshare, and TNCs) target service levels in low-income and underserved communities. Track best practices from national pilot projects where TNCs are serving low-income and underserved communities.

2. Seek funding to expand EV carshare pilot to other communities.

Operationalize equity within LADOT.

1. Develop an equity strategy and define what equity means both internally and externally, and the organization's equity values.
2. Employ multilingual staff, train existing staff, and develop culturally appropriate materials for Los Angeles's diverse communities.
3. Build outreach staff capacity and work with CBOs in low-income communities when establishing or expanding new shared-mobility service.

REINFORCE TRANSPORTATION PRIORITIES IN STREET DESIGN

Manage city streets and curb assets for walking, biking, public transit, and shared mobility, not private vehicles.

By designing, planning, and managing city assets, curbs, streets, and infrastructure, the city is laying the groundwork for walking, biking, public transit, and shared mobility to flourish.

In 2014, Mayor Eric Garcetti formed the Los Angeles Parking Reform Working Group, which included residents, business owners, and community stakeholders. Several key recommendations have been advanced towards implementation, including a digital inventory of city parking assets, neighborhood preferential parking permit reform, LA ExpressPark expansion, and the inclusion of GPS in street sweepers.

In March 2016, LADOT allocated \$1.1 million to begin implementing the working group's recommendation to fund the Code the Curb program. This one- to two-year project will inventory curb regulation along the 7,500 miles of City streets. Once complete, staff and policymakers will be able to comprehensively review how we allocate curb space to ensure congruence with transportation policy goals, and technology developers will be to create apps that facilitate easy parking, loading and other curbside activities.

Our recommendations build on these efforts and include reducing or eliminating parking spaces for single-occupancy vehicles to encourage low-carbon transportation modes. We also recommend that the city allow private developers to provide transit passes and bikeshare memberships in lieu of parking spaces. Increased visibility for these services helps people recognize their convenience.

Reduce or eliminate required parking ratios in zoning code.

1. Incentivize developers and property owners to offer options such as transit passes, bike parking, or carshare pods in lieu of vehicle parking spaces.
2. Unbundle parking requirements from existing land uses and future development.
3. Support amending the federal commuter benefit tax codes to eliminate the pretax parking benefit and replace it with a benefit for new shared-mobility modes, such as bikeshare and microtransit.

LESS ZONING FOR PARKING (AUSTIN, TX)

Within Austin's urban core, developers can set aside carsharing spaces in their buildings in exchange for significantly reduced parking requirements, which is the minimum amount of parking required for each type of building development. This policy helps increase incentives for carsharing and reduces incentives for private car ownership. The city's Land Development Code (Section 25-6-478.E.3) specifies that developers can exchange one carsharing space for a 20-space reduction in the typical parking required, up to a maximum overall parking reduction of 40 percent.

Establish and expand permits for on-street and free-floating carshare.

1. Adopt a permit and fee structure that enables carsharing services to park on the streets, so that the management of street spaces is encouraging more transportation choices.

ON-STREET PARKING PILOT (SEATTLE, WA)

On-street carshare parking increases visibility and encourages carshare membership. Seattle's 2013 pilot program initially offered 350 on-street parking spaces and ultimately led the city council to approve up to 3,000 free-floating carshare vehicles. More than 70,000 Seattle residents have become carshare members since then.

Create incentives to increase vehicle occupancy, including rideshare and ridesource.

1. Prioritize high-occupancy vehicles (HOVs) over single- or zero-occupancy vehicles (as may be the case when autonomous vehicles are on our streets). This could include allowing vehicles to use dedicated bus lanes, preferential pickup/drop-off locations at airports and transit stations for HOVs, or reduced permit or other fees.

Expand the protected bike lane infrastructure program.

1. Prioritize protected bike lanes to reduce conflicts with vehicles. Research TNC pickup/drop-off hot spots and pilot dedicated loading zones for TNCs that are designed to minimize conflicts with bicyclists, pedestrians, and public transit.

PROTECTED BIKE LANES/DEDICATED INFRASTRUCTURE (CHICAGO, IL)

In 2016, Chicago won Bicycle Magazine's award for best biking city in the United States for installing the most miles of protected bike lanes of any city. Dedicated bike lanes are necessary for successful bikeshare systems because they create safer roads and encourage participation by a broader and larger audience, especially among younger and older riders.³⁰ Protected bike infrastructure also reduces congestion and costs for all modes of transport. Analysis of seven major U.S. cities shows that as cities build more bike lanes, the number of cyclists on the road increases and the risk of a cyclist being killed or severely injured drops, often dramatically.³¹ Streets with protected bike lanes have seen up to 90 percent fewer injuries per mile than those with no bike infrastructure.³²

Establish scooter pods to supplement bikesharing for short- and medium-distance rides.

1. Invite scooter companies to implement electric scooter charging and docking station systems as well as kick scooter stations.

Create a comprehensive curb and streetscape inventory and management assessment and use the data as a tool to manage curbs for shared mobility.

1. Begin the first phase of the Los Angeles City Council-funded Code the Curb program to inventory existing curb use regulations on city streets.
2. Designate drop-off and pickup zones for TNCs in congested areas to improve safety and create clarity for both drivers and riders along busy curbsides.
3. Create and promote a standard process to convert curb parking spaces for other uses, such as parklets (small seating areas or green spaces), plazas, and bike corrals, especially in areas with high volumes of pedestrians and bicyclists.
4. Manage curb areas near major transit stations to facilitate multimodality and minimize conflicts between vehicles (buses, taxis, private vehicles, etc.), pedestrians, bicyclists, and transit riders. Include curb areas for bicycle parking and carshare facilities where space allows.

ELECTRIFY VEHICLES AND INFRASTRUCTURE

Electrify shared-mobility vehicles and build EV charging infrastructure.

Since 2013, EV sales have grown exponentially.³³ In 2016, more than 159,333 EVs were sold in the United States. About half of those sales took place in California, and Los Angeles alone accounted for 9 percent of national sales.³⁴ Although this trend is helping to cut the city's greenhouse gas emissions, the city should incentivize the incorporation of EVs for TNC fleets, employee carpools, vanpools, and the city fleet. To that end, the city has set the goal of electrifying 80 percent of the city fleet by 2025.

In order to reach its ambitious goal, the city needs to invest more in EV charging infrastructure. The upfront cost of converting any fleet to EVs can be prohibitive, but some cities, like Indianapolis, have used federal EV rebates to ease that burden, although these rebates are now threatened. Other cities, like Atlanta, are working with EV financing companies. Vision Fleet, for example, is working with Atlanta to launch a 50 EV pilot program to help the city reach its emissions reduction goals.

In 2017, Los Angeles launched an EV carshare pilot program for disadvantaged communities. City policymakers should continue to use price incentives and planning policies to expand electrification of all shared-mobility modes. Los Angeles should continue to invest in public EV infrastructure and to find ways to encourage more EV infrastructure in private garages as well.

Create incentives for use of EVs for carshare, vanpool, rideshare, and ridesource.

1. Incentivize TNC and taxi and car-sharing fleets to electrify through the provision of charging stations, as Southern California Edison (SCE) and San Diego Gas & Electric (SDG&E) have proposed to do.
2. Offer preferential access to pickup and drop-off zones at Los Angeles International Airport for an electrified TNC fleet.

Increase access and adjust policies to expand EV charging infrastructure.

1. Provide charging stations to support an electrified LADOT bus fleet.
2. Support L.A. Unified School District's electrification pilot program for school buses funded by South Coast Air Quality Management District.

3. Strengthen building code requirements for charging station prewiring in new multifamily construction and install charging stations at multi-unit dwellings and workplaces (as Southern California Edison is doing).
4. Accelerate installation of electric vehicle charging stations on utility poles and streetlights, and in off-street parking facilities.
5. Use partnerships to increase access to EV charging stations. Partners could include electric utilities, Electrify America, and other EV charging companies.

DESIGN SEAMLESS TECHNOLOGY SYSTEMS

Create seamless and widely accessible transit rider information, payment, and data systems.

The TAP card used for most Los Angeles buses and trains is not currently usable across all carshare, bikeshare, or ridersourcing trips. This disconnect forces riders to carry multiple payment media and download multiple apps to secure and pay for rides.

To correct this, policymakers should create seamless and widely accessible systems for traveler information, single-platform payments, and data. User-centric systems should make public transit and shared mobility as easy to use as possible and accessible to all communities.

To be fair, integrating these systems across public and private entities is not simple. Barriers include differing fare structures and back-end payment systems. The city needs to identify partners to work toward integration to increase ridership and, in turn, reduce car ownership and greenhouse gas emissions.

Smartphones can serve as secure and convenient ticketing devices, and can be integrated with trip planning apps that provide real-time travel information. The TNCs and bikeshare program in Los Angeles require credit card payments, which excludes unbanked travelers. Fortunately, though, members of the Los Angeles EV Carshare in Disadvantaged Communities pilot will soon be able to access the system with their TAP cards.

PHILADELPHIA'S BETTER BIKESHARE PARTNERSHIP

Philadelphia has a \$100,000 reserve fund to cover bikes damaged or stolen by those who paid with cash, allowing expanded access to users who don't have a credit card linked to their accounts.

Create a single routing, booking, and payment platform to enable access to all mobility options.

1. Continue working with Los Angeles Metro to roll out the next iteration of TAP featuring a single payment platform that includes public transit, bike share, taxis, EV carsharing, other carsharing, and possibly TNCs.
2. Support and integrate Mobility as a Service by integrating tap TAP into new mobility services.

Implement methods for cash payments.

1. Explore technological and financing strategies to offer cash payments for bikeshare program, carshare services, carpool, microtransit, and TNC rides.

ACQUIRE DATA TO BETTER MANAGE THE PUBLIC REALM

Foster data exchange between shared-mobility providers and the city.

Currently, universities and nonprofits bear the brunt of the responsibility for collecting and analyzing data on shared mobility. This is not sustainable. As shared mobility expands, clearly defined data disclosure requirements between private operators and the city are imperative.

LADOT's Urban Mobility in a Digital Age plan recommends conducting an inventory of all current data assets and creating a centralized data catalog for all departments. The report also suggests creating roles and responsibilities within LADOT for managing and analyzing city transportation data, and then identifying gaps and prioritizing the collection of data necessary to meet policy goals. The report further recommends that the agency develop a template contract for working with academia, nonprofits, and private companies that outlines the types of data that must be shared and how. This template would streamline city engagements. Urban Mobility in a Digital Age also recommends conducting data security audits, and establishing baseline standards for data security.

In working with private shared mobility companies, LADOT should require that TNCs share data in exchange for access to the city-owned streets, curbs and other assets that make TNCs viable. Networks of transportation professionals, such as the National Association of City Transportation Officials (NACTO), can gather best practices and recommend policies that encourage governments to adopt these requirements and bring them to scale, providing more certainty to the industry.

When requiring data from third parties, the City should balance businesses' ability to be competitive and profitable, while obtaining enough data to serve the public

good effectively. This data should be managed and verified by a third party (such as the World Bank's Open Transport Partnership) to protect consumer privacy and ensure private companies are reporting all required information. To protect individual privacy, Urban Mobility in a Digital Age suggests minimum thresholds for levels of aggregation before sharing public data on the City's open-data portal, data.lacity.org.

New data could spur analyses, apps, and other initiatives that help riders navigate, planners manage, and the private sector enhance the transportation system. Data related to emerging issues on TNCs, autonomous vehicles, and connectivity could help integrate Los Angeles's current transportation systems with emerging technologies and platforms. Los Angeles should also establish regular institutional assessments of usage, effectiveness, and impact of shared mobility. An iterative and robust monitoring and decision-making structure would promote continuous improvement of system design, operations, and management.

Develop specifications for gathering data from mobility providers.

1. Complete an internal transportation data inventory to determine the data sets the city maintains, those it has access to, and those that would be important to obtain.
2. Standardize the types of data LADOT collects and the method of collection. Develop a strategy for centralized data storage and access.
3. Work with the TNCs, shared-mobility operators, and researchers to uncover barriers to data sharing.
4. Incentivize TNCs to share valuable data sets on travel behavior.

Share transportation data to address privacy concerns and inspire innovation.

1. Post all city-based nonconfidential transportation data sets for innovators to use on Los Angeles's Open Data portal.
2. Determine opportunities for sharing transportation data among the different operational divisions at LADOT.

ENACT SYSTEMIC POLICIES

Design systemwide policies and programs to enhance environmental and social performance of all shared-mobility modes.

Policymakers should strengthen regional policies and programs that incentivize travelers to shift from driving alone in private vehicles to sustainable and equitable transportation modes.



Cities have historically approached this through the creation of transportation demand management (TDM) policies and programs that seek to reduce the number of people driving into congested areas at peak times. TDM policies and programs typically include requiring large employers to support carpool formation, offering cash to employees in lieu of parking, subsidizing transit passes and providing secure bike parking.

Several cities have gone further to reduce congestion by implementing congestion pricing programs. This policy uses price incentives to manage access to the most congested streets or highways. Charges could be applied in different ways depending on the local context, including fees to access a congested area, to drive on certain congested roads, to use a dedicated express lane on a highway, or to access high-demand parking. Other approaches include fees on vehicle-miles traveled, gas taxes, and vehicle emissions.

Pricing streets and highways has successfully alleviated congestion, improved air quality, and reduced collisions in the cities that have implemented it. London's congestion charge initiative reduced vehicle kilometers traveled in the city by 11 percent since 2003, and Stockholm's reduced traffic in its central core by 20 percent five years after its launch in 2006.

As part of its 100 Hours Campaign, the Southern California Association of Governments is currently studying congestion pricing combined with enhanced mobility

options to manage peak period traffic. Metro has also proposed a congestion mitigation fee for new development projects in Los Angeles County to support transportation projects within local jurisdictions. Finally, LADOT has successfully implemented LA Express Park, a pricing-based parking management program that helps ensure parking is available in the busiest commercial districts in Los Angeles.

Implement pricing strategies to reduce congestion.

1. Partner with local transportation agencies to secure funds to deploy innovative pricing pilots in Los Angeles's traffic hot spots.

Strengthen the Transportation Demand Management Ordinance.

1. Continue to promote proven demand management strategies to reduce the number of commuters driving alone, by promoting telecommuting, flexible work hours, carpools and vanpools, transit subsidies, and guaranteed ride-home programs.
2. Update, modernize, and strengthen the city's Transportation Demand Management Ordinance to include shared-mobility services.

Proactively plan for autonomous vehicles.

1. Leverage a citywide autonomous vehicle working group to consider possible scenarios and assess related impacts on broad land use and transportation planning.

SHARED-MOBILITY CLIMATE AND EQUITY STRATEGY MATRIX

GUIDING STRATEGY	RECOMMENDED ACTION	SHARED-MOBILITY MODES	LEAD AGENCY AND PARTNERS	IMPLEMENTATION TIME FRAME		
				NOW (1-2 YRS)	MEDIUM TERM (3-5 YRS)	LONG TERM (5-25 YRS)
Embed Equity Outcomes	Prioritize community engagement and crowdsource shared-mobility location preferences and increase overall access	All	LADOT	✓	✓	✓
	Leverage shared mobility as a pathway for employment and economic opportunity	All (especially bikeshare)	LADOT with community and economic development partners	✓	✓	✓
	Initiate research projects to determine needs, test solutions, and establish metrics for low-income mobility needs	All	LADOT with academic partners	✓		
	Accept cash payments and subsidize or significantly discount bikeshare memberships for low-income communities	Bikeshare Carshare	LADOT and Metro with TAP and vendors	✓	✓	✓
	Incentivize TNCs and bikeshare and carshare providers to operate in underserved, low-income areas	Carshare Ridesource Rideshare Bikeshare	LADOT	✓	✓	✓
	Operationalize equity within LADOT	All	LADOT	✓	✓	✓
Reinforce Transportation Priorities in Street Design	Reduce or eliminate required parking ratios in zoning code	All	LADOT with Department of City Planning	✓	✓	
	Establish and expand permits for on-street and free-floating carshare	Carshare	LADOT	✓		
	Create incentives to increase vehicle occupancy, including rideshare and ridesource	All	LADOT		✓	✓
	Expand the protected bike lane infrastructure program	Bikeshare	LADOT	✓	✓	
	Establish scooter pods to supplement bikesharing for short- and medium-distance rides	Scooter-share Bikeshare	LADOT	✓	✓	
	Create a comprehensive curb and streetscape inventory and management assessment and use the data as a tool to manage curbs for shared mobility	Carshare Ridesource Rideshare AV	LADOT	✓	✓	

SHARED-MOBILITY CLIMATE AND EQUITY STRATEGY MATRIX

GUIDING STRATEGY	RECOMMENDED ACTION	SHARED-MOBILITY MODES	LEAD AGENCY AND PARTNERS	IMPLEMENTATION TIME FRAME		
				NOW (1-2 YRS)	MEDIUM TERM (3-5 YRS)	LONG TERM (5-25 YRS)
Electrify Vehicles and Infrastructure	Create incentives for use of EVs for carshare, vanpool, rideshare, and ridesource	Carshare Ridesource Rideshare AV	LADOT	✓	✓	
	Increase access and adjust policies to expand Electric Vehicles charging infrastructure	Carshare Ridesource Rideshare AV	LADOT with Department of City Planning, Department of Building and Safety, Department of Public Works, and Department of Water and Power	✓	✓	
Design Seamless Technology Systems	Create a single routing, booking, and payment platform to enable access to all mobility options	All (primarily transit)	LADOT with Metro and partners	✓	✓	
	Implement methods for cash payments	All	LADOT with Metro and partners	✓	✓	
Acquire Data to Better Manage the Public Realm	Develop specifications for gathering data from mobility providers	All	LADOT with TNCs and community partners	✓		
	Share transportation data to address privacy concerns and inspire innovation	All	LADOT and Metro	✓	✓	✓
Enact Systemic Policies	Implement pricing strategies to reduce congestion	Carshare Ridesource Rideshare AV	LADOT		✓	✓
	Strengthen the Transportation Demand Management Ordinance	All	LADOT with Department of City Planning	✓	✓	
	Proactively plan for autonomous vehicles	AV	LADOT and AV Working Group	✓	✓	✓

Existing Shared-Mobility Modes

Now that we've explored the recommendations in more detail, we examine each shared-mobility mode in Los Angeles, as well as key challenges that are addressed by the recommendations above.

BIKESHARING IN LOS ANGELES

Bikesharing is the short-term use of a bicycle from a shared, communal fleet. Bikes are usually obtained from self-service docks or stations and must be returned after use to any station within the bikeshare system.

In July 2016, Metro Bike Share launched in Downtown Los Angeles with 1,000 bikes and 65 stations. Metro Bike Share offers monthly memberships for \$20, which allows free trips of 30 minutes or less and \$1.75 per half hour beyond that, and annual \$40 memberships for which all trips come with an additional charge of \$1.75 per half hour of use.³⁵ Metro offers a 40 percent discount on the monthly rate with corporate memberships.³⁶ Bike Share works on the same TAP cards that are used for Metro buses and trains. To offset costs, Metro is seeking sponsorships to private entities. Metro uses a shared-mobility dashboard to share information on total trips, passes sold, and other data with the public and policymakers. Metro also used online polls to site bike-share stations.

In the first two months, user adoption averaged 73 trips per bike, a slower pace than in other large American cities. In October 2016, Metro approved \$42 million in new funding to expand into the communities of Venice, San Pedro, Wilmington, and Pasadena in 2017.³⁷ Between 2018 and 2021, Metro Bike Share expects to expand to Westlake, Koreatown, University Park, Hollywood, West Hollywood, Marina del Rey, Huntington Park, North Hollywood, and East Los Angeles.

Other cities in the Los Angeles region – Santa Monica, West Hollywood, Beverly Hills, and Long Beach – have their own bikeshare programs with separate system operators. Regional integration with cities that have existing contracts with different vendors is a key challenge. Interoperability of vendors and payment systems across multiple bikeshare programs is critical to the success of bikeshare in the coming years.

The National Association of City Transportation Officials' 2015 report outlined factors for bikeshare success.³⁸ Overall, large systems with stations placed closely together have a far better chance of success than small,

disconnected bikeshare systems. Bikeshare use is driven by the convenience of pickup and drop-off locations within easy walking distance of departure points and final destinations. Providing many station options, ideally spaced no more than 1,000 feet apart, greatly increases membership.

Challenges Facing Bikesharing

System size, contiguity, and regional integration are common challenges for bikeshare programs. These programs also often lack appropriate engagement with low-income communities. In response, Philadelphia's PeopleForBikes, a part of the Better Bike Share Partnership, is administering \$900,000 over three years to support nine bikeshare programs across the United States that are working to make these programs more equitable. In 2016, the L.A. County Bike Coalition (LACBC) received one of these grants working with Multicultural Communities for Mobility. LACBC will use these funds to help LADOT and Los Angeles Metro improve bikeshare equity.

BikeShare Specific Recommendations

1. Integrate flexible parking options, including anywhere-parking using in-bike locking technology as well as designated stations.
2. Add data trackers to shared bikes: Collect data to determine the frequency of use, length of trips, average speed, etc. Include sensors to track miles traveled and associated greenhouse gas reductions.
3. Create a balanced portfolio of sites serving different types of trips. Analyze performance within each context.
4. Create a regional bikeshare working group to encourage interoperability.
5. Streamline technology integration as well as fare structures.
6. Install digital bike counters along main corridors to inform and engage riders and other community members.
7. Offer new incentives (e.g., bike-for-free day, bike-to-work day), distribute bikeshare passes through health programs, and provide recognition programs for city employees who travel the most miles by bike.

CARSHARING IN LOS ANGELES

Carsharing began as a decentralized version of the traditional car rental, with a rent-by-the-hour, frictionless system. It has now evolved to include point-to-point, one-way, and peer-to-peer models with memberships in varying price ranges. Carsharing is characterized by shorter-term use, lack of an intermediary, and a membership arrangement. Since 1994, a total of 50 carsharing operations have started in North America, of which 33 are still operating.

Some of the largest carshare providers are Zipcar and car2go. Zipcar provides the majority of carshare service in the Los Angeles region, with more than 350 vehicles. Zipcar has been operating in Los Angeles County since 2008 and began its free-floating car-sharing service locally in 2016.³⁹ Metro recently entered into a partnership with Zipcar that offers hourly or daily reservations at ten Metro park- and-ride transit locations.⁴⁰ Car2go rents smaller vehicles point-to-point by the minute and is available in more cities than Zipcar, but no longer operates in the Los Angeles area.

In 2015, WaiveCar launched in Santa Monica with sponsorship from the health insurance corporation Oscar. WaiveCar rents its fleet of 20 cars for two-hour periods. It plans to expand to 400 cars throughout the region. WaiveCar is the first carshare to use advertising revenue as part of its business model.

GM recently launched Maven, an on-demand hourly carshare, in Los Angeles with an initial fleet of 60 vehicles at 24 sites throughout the city. Maven rents GM vehicles for \$8 per hour. Other car manufacturers are following suit in the urban carshare business.⁴¹

In 2015, the EV Car Sharing Pilot for Disadvantaged Communities was launched in Los Angeles, pursuant to the Charge Ahead California Initiative.⁴² This program aims to help low-income residents gain access to 100 electric and hybrid vehicles and more than 200 charging stations in Westlake, Pico-Union, South Los Angeles, and Koreatown. These communities were shown to be most burdened by pollution according to the CalEnviroScreen index.

The project aims to avert the purchase of 1,000 private vehicles with conventional internal combustion engines, cutting an estimated 2,150 tons of carbon dioxide emissions per year.

Challenges Facing Carsharing

Carsharing has a limited presence in Los Angeles. Los Angeles is inherently challenged by its dispersed residential and employment centers, and a built environment that has largely developed around the private automobile.

A major barrier to carsharing expansion is the lack of dedicated on-street parking for shared cars.

SAN FRANCISCO CARSHARING CASE STUDY

San Francisco rents parking spaces to carshare companies for \$50 to \$250 per month and charges a \$400 installation fee for each space. In 2011, the San Francisco Municipal Transportation Agency (SFMTA) enacted the On-Street Pilot Permit Program, with the goal of collecting data and testing the feasibility of carshare expansion. This two-year pilot program allowed 200 on-street parking spaces, though it was initially cleared for 900 spaces. SFMTA distributed permits to qualified carshare organizations (CSOs) with pricing based on a cost recovery model, including administrative and enforcement costs, and meter revenue loss. The selected CSOs were City CarShare, Getaround, and Zipcar.

Each CSO was required to propose 150 parking spaces, which were then reviewed by SFMTA and other city agencies. Permit price incentives and minimum requirements ensured distribution across three city zones. In external review, CSOs were required to speak with fronting property owners, adjacent property owners, and business owners. Six groups of parking space proposals were discussed in six public hearings, and five were approved by the SFMTA Board of Directors.

Based on the findings of the pilot, SFMTA enacted its Vehicle Sharing Parking Permit Policy in July 2017, reserving up to 1,000 public parking spaces for certified CSOs. Permits will be distributed on a rolling basis. They will follow a similar zone permit model from the pilot study to ensure adequate citywide distribution. Geographic equity and access were highlighted in the definition and pricing of these zones.

The designated zones and permit pricing per space are as follows:

- Zone 1: Downtown and SoMa. \$285/month.
- Zone 2: NoPa, the Haight, Twin Peaks, Inner Sunset, and Inner Richmond. \$180/month.
- Zone 3: Western and Southern neighborhoods, including Outer Richmond, Outer Sunset, Ingleside, and Bayview. \$50/month.

Currently, 140,000 San Francisco residents use carsharing services, and each vehicle averages six hours of use per day. SFMTA estimates that carshares have prevented the use of up to 60,000 privately owned vehicles.^{43,44,45}



RIDESOURCING IN LOS ANGELES

Ridesourcing uses private, nonprofessional drivers and their personal vehicles to offer rides for hire. TNCs provide the technology platform—usually smartphone applications like Uber or Lyft—to connect drivers and passengers by handling real-time trip requests and payment. Both Uber and Lyft have launched services that allow multiple passengers along similar routes to share the same vehicle for a discounted ride, in an arrangement known as ridesplitting.

GOOD FOR CITIES?

TNCs are disrupting traditional mobility, in some cases eliminating the need for a private vehicle. As such, they have garnered significant attention and venture funding.

TNCs maintain that their services help to fill empty seats in cars, take cars off the road, and provide users the convenience of car mobility without requiring car ownership. However, early data from New York City and San Francisco suggest that TNCs are introducing tens of thousands of new vehicles onto city streets, increasing congestion and pollution and undermining public transit, walking, and biking. Stronger, more thoughtful regulation of TNCs is warranted, yet some cities, including Los Angeles, lack authority to regulate them. This underscores the need for the leadership from the California Public Utilities Commission, which regulates the TNCs, and for further state legislation.

Since the advent of ridesourcing apps like Uber and Lyft in Los Angeles, prearranged taxi trips have fallen by 42 percent, and taxi trips overall have declined 30 percent.⁴⁶ Both have partnered with transit agencies in Los Angeles to explore how ridesourcing can complement public transit services as a first- and last-mile connector.

Challenges Facing Ridesourcing

Ridesourcing has complicated the regulation of the ride-hailing industry, particularly regarding insurance, safety, and unionized labor. It has also threatened the market dominance of existing taxi companies. The on-demand, cashless, and often cheaper nature of ridesourcing has quickly made it a popular mode of travel.

The taxi industry has argued that TNCs have an unfair advantage since they are often regulated at the state level, whereas taxis are usually regulated by a city or other local municipality. This disparity affects how permits, training, insurance, background checks, safety, and data submission are handled. As a result, TNCs have been able to rapidly expand their businesses in most major cities. Taxi companies have tried to match the ease of ridesourcing platforms with new apps such as Curb, Flywheel, Arro, Way2Ride, and RideYellow.

Strong state level regulatory preemption limits the ability of cities to effectively integrate ridesourcing into local transportation planning decision, such as the number of taxis on the road and their rates, as well as regulation of TNCs. In 2015, the California State Assembly Bill AB650 would have expanded the state's reach by bringing taxicabs under regulation by California Public Utilities Commission, rather than each local city. It was vetoed by Governor Jerry Brown.⁴⁷ The Los Angeles City Council voted to oppose the legislation, in part because it would mean the loss of income from taxi permit fees, and the inability to set environmental and equity service benchmarks for taxi companies.

Lyft and Uber still struggle to incentivize drivers to service lower-income neighborhoods or the suburbs. At least half of these kinds of trips are one way, forcing drivers to drive back to the city with no fare.⁴⁸ Furthermore, analysis shows that surge pricing—an increase in fare triggered in periods of high demand—draws more cars to and produces shorter wait times in wealthy neighborhoods, leaving lower-income neighborhoods with longer wait times.

TNCs have been reluctant to release their transportation data, citing proprietary, privacy, and competitive concerns. As state and local governments refine their shared-mobility planning and open-data policies, access to appropriate data will be necessary to pursue city goals, particularly equity targets and greenhouse gas emissions reductions.

Loss of city revenue is another challenge associated with the rise of ridesourcing. Revenue can be lost if TNCs do not pay for business licenses or if they take trips away from incumbent taxi services that pay city licensing and pickup fees. The rise of TNCs has correlated with falling taxi medallion values, representing another lost city revenue source. In New York, medallion values fell by 23 to 28 percent in 2015.

RIDESHARING IN LOS ANGELES

Ridesharing, not to be confused with ridesourcing, is often referred to as carpooling. The distinguishing difference between the two is that with ridesourcing services such as Uber, the driver does not share the same destination as the passenger(s). Ridesharing on the other hand implies that all occupants have the same or proximate destinations.⁴⁹ It involves the sharing of car journeys by more than one person to reduce the driving time, cost, or stress from driving. Nationwide, about 10 percent of work commutes involve carpooling. While that rate has declined over the decades, it has seen a slight uptick in recent years. Recently, technology-based services have attempted to tap into the carpooling market. In November 2016, UberCommute launched in the Philippines. In 2016, Lyft piloted a carpooling service in Silicon Valley. In May 2016, Google launched Waze Carpool.

Lyft Line and uberPool include a shared journey in full or in part by multiple passengers. However, they still involve the driver picking up riders in almost the same fashion as the standard ridesource services; this form of ridesourcing is sometimes referred to as ridesplitting. This is in contrast with ridesharing, in which the driver was already planning to take a trip and takes passengers along the way. Ridesplitting involves a paid driver offering a trip to multiple passengers along a route they wish to travel.

Privately operated microtransit is a cross between carsharing and conventional public transit in terms of both size and flexibility. However, it differs from fixed-route transit service and is characterized by on-demand, flexible routes that can be determined in real time based on demand. Microtransit can serve niche markets or regions, such as people with disabilities, college campuses, or corporate offices. Examples include New York City's informal ridesharing dollar vans, commuter vans, large corporate shuttles like Google buses in Silicon Valley, and private informal camionetas operated by and for primarily Latino communities. TransLoc offers a "flex-transit" platform that matches riders with appropriately sized vehicles (vans or buses) from nearby pickup and drop-off points.

Specifically in Los Angeles, Angelenos arrange thousands of carpools on their own every day. In addition, public agencies have invested in encouraging ridesharing to reduce single-occupancy vehicle trips. After the Northridge earthquake in 1994, the Los Angeles Smart Traveler program tested a telephone-based, ride-matching system. Although the program had a relatively low match rate and high operational cost, subsequent initiatives have been more successful.

In 2007, Metro started the Metro Vanpool Program, offering a subsidy to cover half the monthly lease costs of a commuter vanpool, up to \$400. Now, more than 3,000 vanpools operate in Greater Los Angeles. The largest vanpool operators include Metro, Los Angeles County, and the University of California, Los Angeles. The City of Los Angeles operates 85 vanpools for its employees and Los Angeles World Airports has the largest and most comprehensive airport employee rideshare program in the United States.

Informal camioneta services also started in Los Angeles more than 20 years ago to close the gap in local and regional service primarily for Latino communities. Major pickup and drop-off hubs are usually located near Greyhound and other bus terminals to link passengers traveling in and out of the city.

Enterprise Rideshare operates carshares and vanpools as well as vRide, which links riders with existing vanpools or sets up its own vanpools. After starting a pilot program in Chattanooga, Green Commuter now offers electric vanpool and Tesla Model X carshare rental vehicles in Los Angeles. Additional ride matching services available to Angelenos include CarpoolWorld, 511, Enterprise's Zimride and ridematch.info.

Challenges Facing Ridesharing

There are still significant barriers to the adoption of ridesharing. A primary challenge is a lack of flexibility for users in scheduling their departure time and in chaining multiple trips together. A lack of critical mass of participants can also make it difficult to match people for trips. Lack of outreach and engagement with potential and existing passengers is another problem. For instance, even though Berkeley's program with City CarShare was officially cancelled because of costs (particularly from lost key fobs), the lack of employee education on the service contributed to the program's demise.

Lastly, carpools and vanpools tend to best serve workers with consistent schedules and workplaces. This may leave out lower-income workers who have unpredictable shifts and multiple work sites. Mitigation measures include providing guaranteed rides home for workers who need to stay at work late or leave work early for an emergency.

Although the risks are minimal, carpools and vanpools can raise safety concerns about riding with strangers. Some ridesharing services address safety concerns with reputation-based systems to build trust and flag problematic users.

Emerging Modes

SCOOTER SHARING

Although the full potential of urban scooter use has yet to be explored, scooter-sharing initiatives—similar programs to car sharing but with scooters—are beginning in cities around the world, including Berlin and Paris. Los Angeles currently has no permitted scooter-sharing programs. The Los Angeles region has seen shared electric scooter service, Bird, enter the market. Local agencies should engage with Bird and other providers to facilitate access to another shared mobility tool for residents, while continuing to ensure the public is served safely and equitably. Additionally, Los Angeles Metro recently approved passengers to bring URB-E, a collapsible personal electric transportation vehicle, onto all buses and trains. The URB-E is classified as a non-pedaling bicycle that is legal on both streets and sidewalks, similar to regular bicycles.⁵⁰

Electric scooters have speed limitations and must be recharged, which restricts how far they can go in a single journey. For instance, the GenZe 2.0 electric scooter has a top speed of 30 mph and a 30-mile battery range and the Scoot Quad tops out at 25 mph and has a range of 40 miles.^{51,52} Scooters are also designed primarily to carry only one person with minimal gear. Distance and speed restrictions aside, scooters may be well suited to cities with hilly terrain that can be challenging for bicycling.

Confusion over licensing for electric scooters could discourage potential users. These requirements vary by county and state, as well as the specification of the scooters, particularly maximum vehicle speed. For instance, San Francisco-based Scoot Networks does not require its electric scooter-share users to have motorcycle licenses. Since Scoot vehicles do not exceed 30 mph of maximum speed, they do not fall under the licensing requirements in the state of California.⁵³

AUTONOMOUS VEHICLES

Although not necessarily shared transportation, autonomous vehicles (AVs) will most likely have a significant impact on many other forms of shared mobility by reducing the cost and increasing the convenience of traveling by car.

While much is yet unknown about autonomous vehicles (AVs), the impacts from the Transportation Network Companies Lyft and Uber may offer an early indicator of the projected effects of AVs on transit, congestion, and cities overall. Thus, enacting these policies and programs now can help to serve as a hedge against the projected increases in vehicle miles traveled associated



with AV deployment. Fehr and Peers found that vehicle miles traveled would increase 12 to 68 percent if AVs proliferated without requirements that they be operated in shared fleets.⁵⁴

Some experts estimate that if technological and regulatory issues are resolved, up to 15 percent of new cars sold by 2030 could be fully autonomous.⁵⁵

As of May 2016, General Motors and Lyft began testing a fleet of self-driving Chevrolet Bolt electric taxis on public roads in San Francisco. The program relied on the acquisition of technology as part of GM's separate purchase of San Francisco-based Cruise Automation, which develops autonomous driving technology.⁵⁶ In addition, GM aims to make Lyft and its growing roster of drivers the primary customers for the Bolt beginning in 2018. Not to be outdone, Uber also has a self-driving research center in Pittsburgh and is preparing to incorporate autonomous vehicles into its fleet by 2020.⁵⁷

In 2017, the Union of Concerned Scientists developed guiding principles for AV public policy to maximize the environmental and public benefits of this transportation innovation. These high-level principles include: take a holistic view on safety beyond just motorists; cut transportation pollution as much as possible; reduce congestion through transit and AV integration; improve equitable access to transportation; support the transition of workers displaced by AV technology; establish a framework for data sharing; and improve the use of infrastructure for livable cities.

In 2015, the California DMV released draft deployment regulations for autonomous vehicles, making California was the first state to propose regulations for AVs, and Los Angeles was the only city that had input into that rulemaking process. These regulations require that vehicles have a driver behind the wheel at all times, thus prohibiting Google and Uber's driverless taxi systems. However, these regulations were amended in October of 2017 to allow driverless AVs to be tested in the state. Following California's lead, the District of Columbia, Florida, Michigan, and Nevada have also passed AV legislation. Many more states are considering bills.

Conclusion



The City of Los Angeles and its surrounding region are emerging from their car-centered image. They are now charting a clear path toward sustainability and innovation. Traffic congestion, poor air quality, greenhouse gas emissions, and inequitable access to affordable transportation have created a sense of urgency to rethink transportation for the area's diverse communities. Several plans have been developed to advance sustainable transportation and investment in public transit, and new forms of mobility have increased.

Recent advances in technology, uses of data, and peer-to-peer service sharing have led to new mobility models and opportunities. Shared mobility offers the potential to help tackle some of the city's critical environmental and social needs, but also presents new challenges.

However, as noted throughout this action plan, shared mobility could add more vehicle miles traveled on city streets and increase the divide on transportation

access. Therefore, cities need to proactively shape the transportation systems of the future. With near-term policies and programs, the City of Los Angeles can ensure shared-mobility services contribute to a more sustainable and equitable community.

Los Angeles's ability to adapt its transportation planning based on new information is critical in the face of the uncertainty and rapid change in the shared-mobility field. Transportation leaders must be cognizant of the coming mobility sea change of autonomous vehicles.

From now on, the City of Los Angeles must adopt flexible principles for policy development. Shared mobility is a rapidly changing area. While this report represents our most informed analysis and thinking today, we encourage the city and others to be flexible and adaptable as they move forward.

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Appendix A

Sustainable City pLAN: Transforming Los Angeles (2015)⁵⁸

The Sustainable City pLAN is a roadmap for an environmentally healthy, economically prosperous, and equitable Los Angeles. It includes both a long-term vision and short-term goals with clear milestones and metrics to measure progress over the next 20 years. The plan establishes a vision within 14 topic areas to transform Los Angeles. One of the main long-term targets is to reduce greenhouse gas emissions in the city by 45 percent by 2025, 60 percent by 2035, and 80 percent by 2050. The plan also aims to increase the number of trips made through shared services, including carshare, bikeshare, and rideshare, to at least 2 percent by 2025 and 5 percent by 2035.

The pLAN also sets strategies for extensive transit and public electric vehicle infrastructure development, including 1,000 public electric vehicle charging stations, which will contribute to the creation of 20,000 new green jobs by 2017. The city will also green its fleet by ensuring that 50 percent of light-duty vehicles are EVs by 2017, rising to 80 percent by 2025, and 100 percent by 2035. Specific initiatives range from piloting new low-impact transport (electric buses, carshare, biofuels, etc.) and using telematics, route optimization, and other approaches to reduce total miles traveled to increasing participation of city employees in public transit incentive programs. The pLAN also calls for the city to work with other agencies to create regional strategies and commitments on key issues like transportation and air quality.

City of Los Angeles Mobility Plan 2035: An Element of the General Plan⁵⁹

Mobility Plan 2035, adopted by the Los Angeles City Council in 2016, provides the policy foundation for achieving a transportation system that balances the needs of all road users. As an update to the city's General Plan Transportation Element (last adopted in 1999), Mobility Plan 2035 incorporates complete streets principles and lays the policy foundation for how future generations of Angelenos interact with their streets. One of the key policy initiatives is to use technology, such as real-time transportation applications, to increase awareness of and access to options for parking and multimodal transport (carshare, bike share, carpool, vanpool, bus and rail transit, shuttles, walking, bicycling, and driving).

In the plan's Access for all Angelenos section, there are two shared-mobility objectives: to provide a shared-use vehicle within a half mile of 75 percent of households by 2035 and to provide access to bikesharing within a

quarter mile of 50 percent of LA households by 2035. Other objectives include funding active transportation; advocating for funding multimodal infrastructure projects; and promoting nonownership models for vehicle mobility, feeder bus services for local neighborhoods, and shuttle bus programs to connect events or specific populations with transit stations.

City of Los Angeles Mobility Hubs, A Reader's Guide⁶⁰

The Mobility Hubs program is an extension of the Mobility Plan 2035 of the Los Angeles Department of City Planning, developed in coordination with the Los Angeles Department of Transportation and the Los Angeles County Metropolitan Transportation Authority. The Mobility Hub Reader's Guide provides guidance and inspiration for city staff, property owners, developers, designers, transit agencies, and community members for enhancing, with amenities, activities, and programs, project developments and public right-of-way improvements in proximity to existing or new transit stations. In doing so, the goal is to support multimodal connectivity and access.

Urban Mobility in a Digital Age: A Transportation Technology Strategy for Los Angeles (August 2016)⁶¹

The city's transportation technology strategy proposes several policies, near-term actions, and pilot projects for LADOT to consider. The strategy suggests that LADOT evolve into a platform for transportation innovation that focuses on three customer services: data, mobility, and infrastructure. The strategy covers several broad goals including to build a solid data foundation; leverage technology and design for a better transportation experience; create partnerships for more shared services; establish feedback loops for services and infrastructure; and prepare for an automated future.

Measure R (2008) and Measure M (2016)⁶²

The passage of Measure R in the November 2008 election brought added transportation funding for rail lines to Los Angeles, supported by a half-cent sales tax increase. In November 2016, voters approved Measure M, another half-cent sales tax increase for traffic improvements. In the City of Los Angeles, Measure M will bring in an extra projected \$56 million in its first year for transportation projects, and it is estimated that will increase yearly and total \$4.5 billion over the next 40 years. Projects that will be funded include transit corridors, bus rapid transit, first- and last-mile solutions, active transport, equity programs, bike paths, a historic downtown streetcar, streetscape

improvements, traffic congestion relief, and signal synchronization. Regional and municipal transit and rail operators in Los Angeles will also receive new funding.

Senate Bill 1275, or the Charge Ahead California Initiative (2014)⁶³

Charge Ahead California is an equity initiative to bring one million electric cars, trucks, and buses to California by 2025 and ensure that low-income Californians, who are disproportionately affected by air pollution, benefit from the transition to a clean transportation sector. Senate Bill 1275 led to the 2015 City of Los Angeles electric carsharing pilot in low-income communities in the urban center.

Regional Bikeshare Implementation Plan for Los Angeles County (2015)⁶⁴

This plan outlines a business model to bring bikeshare to more cities within L.A. County. Under the plan, Metro administers a master contract and pays 50 percent of capital costs and 35 percent of net operations and maintenance costs. The plan envisions a bikeshare system that begins with 99 stations and 1,580 bikes in phase 1 and two pilot areas—Downtown Los Angeles and Pasadena—and eventually grows to a total of 254 stations and 3,800 bikes in multiple communities around Los Angeles County by 2021. Future expansions to bikeshare-ready communities are to be identified subsequently. The plan includes business plan recommendations for operating a regional bikeshare system in Los Angeles County, a bikeshare readiness analysis, and a station siting analysis.

Metro Long Range Transportation Plan (2009) and City of Los Angeles Department of Transportation Short Range Transit Plan (2014-2015)^{65,66}

In order to execute the Long Range Transportation Plan effectively, Metro requires that each transit operator in its region that receives federal Transportation Improvement Program funding prepare, adopt, and submit a short range transportation plan. Together, these plans outline development and funding for bus, light rail, heavy rail, bus rapid transit services, commuter rail, and freeway and expressway projects. Metro's plan includes shared-mobility aspects through transit improvements and carpool programs and lanes. LADOT's plan includes the Los Angeles Streetcar project, TAP cards for downtown city employees, a zero-emission bus demonstration project, a mobile ticketing and transit-fare technology demonstration, new commuter express buses, CNG-fueled DASH community circulator buses, and new solar-powered bus arrival time message signs.

First Last Mile Strategic Plan & Planning Guidelines (2014)⁶⁷

This plan was jointly funded by the City of Los Angeles and Metro, in partnership with the Southern California Association of Governments (SCAG). The purpose of the plan is to better coordinate infrastructure investments in station areas to extend the reach of transit, with the ultimate goal of increasing ridership. The guidelines aim to facilitate the integration of mobility solutions in a complex, multimodal environment and build on SCAG's Regional Transportation Plan/Sustainable Community Strategy and Metro's Countywide Sustainability Planning Policy.

Great Streets for Los Angeles, the City of Los Angeles Department of Transportation Strategic Plan (2014)⁶⁸

This is LADOT's first strategic plan to turn the city's essential infrastructure—its streets and sidewalks—into safer, more livable 21st century public spaces that accommodate everyone who uses them. Two key shared-mobility aspects of the plan are to implement regional bikeshare and to expand access to shared vehicles through nonownership models.

Los Angeles County Shared Mobility Action Plan (2016)⁶⁹

The Los Angeles County Shared Mobility Action Plan includes a 2 percent vehicle reduction target for 2025 that will remove more than 100,000 private vehicles from the road by scaling up public transit options and their interaction with shared mobility. Removing 100,000 cars could cut carbon dioxide emissions by 375,000 tons annually, reduce vehicle miles traveled in Los Angeles County by one billion per year, and save \$350 million in annual household transportation costs. Los Angeles County can reach this goal by adding 34,000 new transit riders, 16,800 carpoolers, 8,400 carshare users and 10,000 bikeshare bikes. These efforts to expand transportation options can potentially fill gaps in the transit system and provide Angelenos with improved options to travel in Los Angeles County.

Vision Zero for Los Angeles (2015)⁷⁰

Every year, there are more than 200 traffic-related deaths in Los Angeles. Vision Zero is the city's road safety policy promoting behavior and road design to eliminate traffic deaths by 2025. Two of the principles embedded in the ten-year plan are that human life is a higher priority than other objectives of the road system and that reducing speeds overall improves crash survival. Vision Zero has implications for sustainable transportation because traffic deaths disproportionately involve walkers and cyclists. To ensure these environmental and equitable modes form a

key part of a shared-mobility network, walkers and cyclists have to be made less vulnerable to injury and death. A large proportion of serious injuries and deaths occur in the most vulnerable communities and these will be targeted for safety improvements through Vision Zero. Specific policy goals are to reduce city traffic deaths by 20 percent by 2017 (prioritizing pedestrian deaths involving older adults and children) on the way to eliminating them by 2025. Vision Zero Alliance members include AARP California,

Advancement Project, The Asian Pacific Islander Obesity Prevention Alliance, Communities Actively Living Independent & Free, Community Health Councils, The Los Angeles County Bicycle Coalition, Los Angeles Walks, Multicultural Communities for Mobility, PALS for Health, Safe Routes to School National Partnership, T.R.U.S.T. South L.A., and The Youth Policy Institute.⁷¹

Appendix B

Universal Transit Payment Systems

A unified payment system is ideal for incentivizing riders to use multiple methods of public and shared transit. One system that can be used for trip planning, public transit fares, carshare, bikeshare, and ridesourcing will let riders move seamlessly throughout the city without the need to own and park a private vehicle.

Chicago, Ventra Card

The Ventra card and associated app links all public transit options in Chicago and lets users reload their contactless payment cards through a smartphone app. The card and app can be linked to personal bank cards and integrated with Apple Wallet. Ventra also issues disposable paper tickets for single rides or day passes. The app offers real-time system updates and schedules.⁷² The Ventra fare payment system, launched in 2013, was developed by Cubic Transportation Systems (CTS) and the Chicago Transit Authority (CTA). The associated Ventra app was developed and launched in 2015 by CTS, CTA, and their transit partners, Metra (commuter light rail) and Pace (suburban bus operator).⁷³

Hong Kong, Octopus Card

The Octopus System in Hong Kong can be used to pay for all public transit in Hong Kong and gives riders the option to load a pass for public transit that crosses the border into China. The Octopus card is also accepted as payment for retail store and online purchases, parking, and even health services. The card can be reloaded with a credit card, in person at convenience stores, at vending machines, or with cash. Established in 2005, Octopus Holdings is owned by the major transportation operators in Hong Kong. Octopus Cards Limited is a wholly owned subsidiary that runs the contactless cards and payment systems branch of the company.⁷⁴

Japan, PASMO

PASMO is a smart card that can be used in place of a train or bus ticket, or cash. Launched in 2007, PASMO can also be used for payment in stores that take credit cards. Credit can be added at vending machines with instructions in Japanese and English. The PASMO cards can be used to rent a locker at transit stations, buy goods from vending machines, and pay for parking. The cards give travelers a seamless option for using public transit throughout the city, and integrate with almost all daily payment needs. In 2004, PASMO Corporation was formed by 30 bus and rail providers in Japan as a common payment system.⁷⁵

London, Oyster Card

Oyster is a smart card that stores pay-as-you-go credit, Travelcards, and Bus & Tram passes. Oyster can be used to travel on London's buses, the Tube, tram, DLR, London Overground, TfL Rail, Emirates Air Line, River Bus services, and most National Rail services in London. The contactless smart card technology was developed and is supported by Cubic Transportation Systems.⁷⁶

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