Bay Area Carsharing Implementation Strategy

February 2018

METROPOLITAN
TRANSPORTATION
COMMISSION

Table of Contents

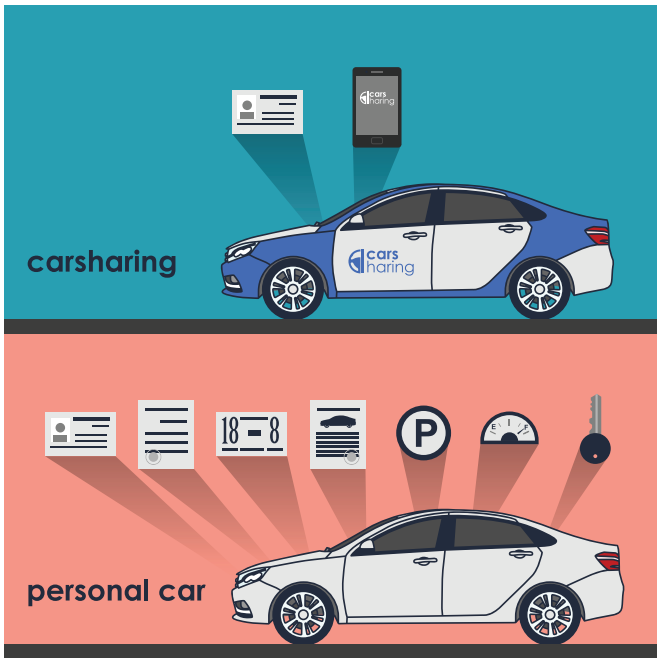
Table of Contents, continued

1.0 Introduction

This Implementation Plan is part of the Carsharing Strategy within MTC's Climate Initiatives Program. The Climate Initiatives Program is identified in Plan Bay Area 2040, the region's sustainable communities strategy and regional transportation plan, which is focused on investing in strategies that contribute to achieving the region's greenhouse gas (GHG) emissions reduction target by reducing transportation-related emissions and vehicle miles traveled (VMT) and encouraging the use of cleaner fuels.

The Carsharing Strategy is intended to identify opportunities to grow carsharing membership and usage in the Bay Area as a method of reducing single-occupancy vehicle (SOV) trips and VMT, with the overall goal of reducing GHGs. Carsharing is a service that provides members with access to an automobile for short-term, usually hourly, use. Shared cars are distributed across a network of locations and members can access the vehicles at any time with a reservation. Use is charged by time or mile and generally includes the cost of insurance and fuel and sometimes parking. Carsharing provides some of the benefits of a personal automobile without the costs of owning a private vehicle.

Research from the University of California-Berkeley and others suggests that each carshare car can remove 9 to 13 privately owned vehicles from the road by allowing households to shed vehicles (going from two or more household cars to one, or one to zero) or delay or forgo the purchase of a new car. Carsharing and other forms of shared mobility have also been associated with greater use of public transit and higher levels of walking



and biking. These travel and lifestyle changes can create significant reductions in GHG emissions from transportation and add up quickly as programs scale.

This report presents the Carsharing Implementation Strategy and includes a review of the state of carsharing in the Bay Area, a Bay Area carsharing opportunities analysis, recommended carshare growth strategies, and conclusions and action items.

The study was led by MTC staff with assistance from the Shared-Use Mobility Center (SUMC), UrbanTrans North America, and representatives from regional governments and carshare operators. The study effort involved a variety of work to gather information and ideas to be used in the creation of recommendations. Activities included:

- A workshop in Hayward with carshare operators and representatives from several Bay

Area municipalities to assess local carshare opportunities and challenges

- A review of carshare policies in the Bay Area and nationally
- A carsharing opportunity analysis using SUMC's shared mobility opportunity model
- One-on-one interviews with carsharing experts and providers
- Research on local, state, and federal funding sources

1.1 Summary of Recommendations

This report makes five recommendations to encourage the expansion of carsharing in the Bay Area. The primary recommendation is the creation of a "one-stop shop" that would include model regulations, marketing materials, and requests for proposals. These materials would be developed by MTC staff in coordination with local governments. MTC would subsequently maintain the materials and share them through its website, educational events, and direct support to local governments. The purpose of the one-stop shop is to address a need cited by carshare agencies and local governments to address a lack of coherent policies and basic awareness about carsharing. By creating consistency across the region, cities lower the bar to entry for carshare operators while simultaneously better enabling innovation. In addition to benefiting carshare operators, the one-stop shop will reduce local government time associated with the creation and adoption of carshare policies and regulations.

The one-stop shop will serve as an umbrella strategy to support the other recommend strategies. However, implementation of the one-stop shop is not a prerequisite for implementation of the other recommendations; they can be implemented individually. Those strategies are:

1) Integrate carshare incentives into the development review process and TDM plans. The provision of carsharing spaces and memberships should be encouraged through the development review process for multi-family residential, mixed-use, and commercial developments through regulations or incentives that encourage the provision of transportation demand management programs.

2) Integrate carsharing into the fleet operations of local governments. To increase the availability and utilization of carsharing services, MTC should develop tools and resources that encourage municipalities to transfer part or all of their fleet operations to a carshare based model.

3) Integrate carsharing into trip planning, transportation information, and Mobility as a Service (MaaS) apps. MTC should identify opportunities to integrate carshare information into trip planning and MaaS apps that are used by travelers to plan, schedule, and pay for trips.

4) Increase the number of carshare vehicles at transit/mobility hubs around BART and bus stations. MTC can assist local governments, transit agencies, and carshare operators with the development of standardized agreements for the provision of carshare vehicles at key transit stations that offer the opportunity to create highly visible intermodal connections.

An estimate of the greenhouse gas (GHG) reduction potential of carsharing was developed

by conducting a carshare opportunity analysis for the Bay Area using a model developed by SUMC. The model accounts for several variables that correspond to a community's likelihood to support car sharing. The model was used to review 16 municipalities identified in Plan Bay Area 2040 as top cities for housing growth in coming decades. Three carshare growth scenarios were then developed that estimated the number of carshare vehicles that each city could potentially support under 3-, 5-, and 10-percent rates of carshare adoption among eligible drivers. These results, in coordination with research on the GHG reduction benefits of carsharing, were used to estimate the potential GHG reduction potential of carsharing in the Bay Area. Depending on the level of adoption, reductions range from 3,990 to 13,300 tons per year. Assuming full implementation of all recommendations, the project team anticipates that the actual reduction will fall between 3,990 and 6,650 tons per year.

2.0 State of Carsharing in the Bay Area

The Bay Area was the site of some of the earliest carsharing experiments in the US and the world, going back to the Short-Term Auto Rental (STAR) demonstration in 1983-1985[1], and the region has continued to lead the nation in the launch and testing of new carsharing technologies and models. The current incarnation of carsharing in the Bay Area may be traced to 2001, with the arrival of the nonprofit City CarShare. Since then the market has evolved significantly, with the introduction of several new providers and business models, including one-way and peer-to-peer carsharing. The public sector has also played a notable role in supporting the growth of carsharing through enacting public policy and subsidizing pilots and services. In 2014, for instance, MTC awarded grants totaling $2 million to initiate or expand carsharing access in six Bay Area communities that did not then have robust carsharing services.

Carsharing is generally most available in areas with the highest population density. The highest concentrations of carshare vehicles are in San Francisco, followed by Berkeley and Oakland, along with pockets of high relative availability in Palo Alto—particularly the Stanford University campus—and elsewhere in the Santa Clara Valley.

This clustering can be seen clearly in Figure 1 (see next page), which maps the count of carshare vehicles per acre (the darker the shading, the more carshare cars). While these cities represent the highest concentration of carshare vehicles, much of the Bay Area has at least some access. At the same time, there are still large gaps, and significant obstacles remain to scaling carsharing widely across the region. These include uneven population density, limited awareness of carsharing, policy constraints, and land use not conducive to the basic pedestrian accessibility that is essential for successful carsharing operations. More information on opportunities and challenges is included later in this memo.

2.1 Bay Area Carshare Operators

Five carshare operators, representing several different business models (described in Section 2.2) are active in the Bay Area:

- **Zipcar:** A round-trip carshare provider, Zipcar first launched in the Bay Area in 2005 and currently has some 980 vehicles in the region. Because round-trip carsharing does not require the same density or scale as other models such as one-way, Zipcar has been able to place small, two or three-car pods in many communities.
- **Getaround:** Peer-to-peer (P2P) carshare operator Getaround initiated service in 2013 and currently has approximately 1,470 cars in its

1 Ortega, Juan. N.D. "Carsharing in the United States Helping People Transition from Welfare to Work and Improving the Quality of Life of Low-Income Families," pp. 2-3. http://web1.ctaa.org/webmodules/webarticles/articlefiles/carsharing_report_final.pdf Murphy, C. and Feigon, S., 2016. Shared Mobility and the Transformation of Public Transit. Research Report 188, Transit Cooperative Research Program.

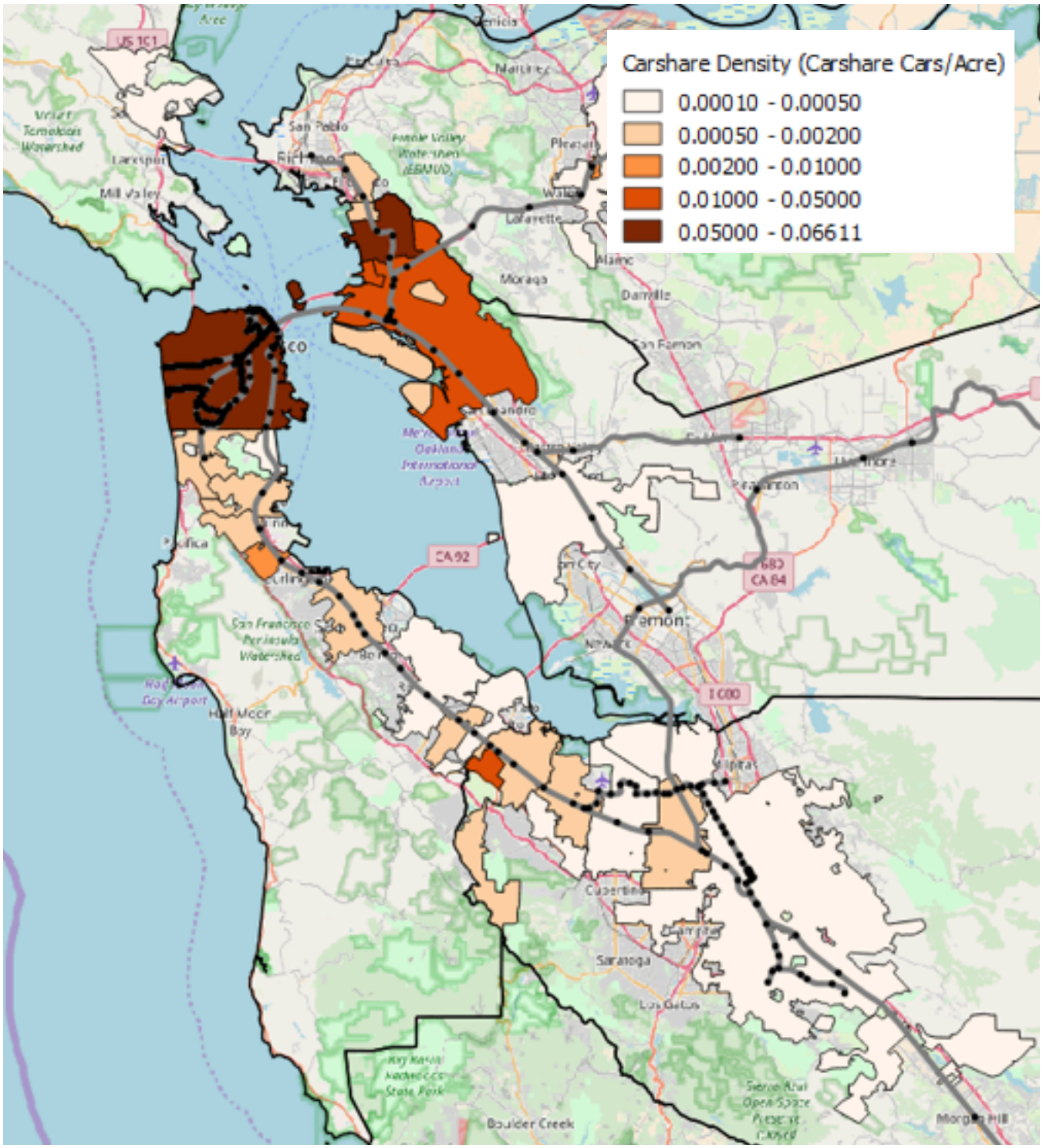


Figure 1: Density of carsharing vehicles in Bay Area municipalities (SUMC, 2017)

Bay Area network. In 2016, City CarShare added its fleet to Getaround's network. City CarShare merged with technology company Carma in 2015 and is no longer operating as a standalone entity. While we do not know the precise number of City Carshare members carried over to Getaround, they remain part of a pool of potential users who are already educated in the use of the mode, in the San Francisco and Berkeley area.

- **Turo:** P2P operator Turo originally launched in San Francisco in 2010 as Relay Rides before rebranding in 2015. Its model focuses on longer-term rentals, ranging from one day to one month.
- **Maven (GM):** General Motors launched its round-trip carshare service Maven in October 2016 and currently has approximately 60 vehicles in the Bay Area. June 2017 saw the Bay Area debut of Maven Gig, a Maven product that rents cars (including EVs) on a weekly basis to drivers for transportation network companies such as Uber and Lyft.
- **Gig (AAA):** AAA launched the one-way service Gig in April 2017 and currently operates across both Oakland and Berkeley with about 250 total cars. The program, which allows users to begin and end their trip in either city, is one of only a handful of multi-jurisdictional one-way carshare programs.

Other relevant mobility providers operating elsewhere in the U.S. include:

- **ReachNow (formerly DriveNow):** BMW launched its free-floating one-way service DriveNow in the Bay Area in 2012. The service secured street parking in several areas of San Francisco—including the Mission, Bernal Heights, Potrero Hill, Noe Valley, and the Haight—and served other Bay Area locations including Mountain View, San Jose, and the Oakland and SFO airports.

  Unlike other cities with one-way carsharing, however, San Francisco did not have a policy allowing companies to readily use on-street parking, including a means of reimbursing the city for use of metered spots. As a result, DriveNow left the Bay Area market in 2015. The service, rebranded ReachNow, subsequently launched in several other regions and is currently operating successfully in US markets including Seattle, Portland, and Brooklyn. Given recent policy changes in some cities in the region—particularly the Oakland and Berkeley one-way carshare policies—a return of ReachNow is possible if more Bay Area cities were to adopt supportive policies.
- **Car2go:** Daimler's car2go is a one-way carshare service currently operating in several US cities, including Austin, Columbus, Denver, New York City, Portland, and Seattle. Car2go previously operated a one-way, EV carshare service in San Diego but stopped operations in 2016 for a variety of reasons, including delays in installing anticipated EV charging stations.
- **Scoot:** Founded in 2011, Scoot is an electric scooter mobility service that operates similarly to one-way carshare. Scoot currently serves San Francisco with a fleet of approximately 800 vehicles. The scooters reach 25 miles per hour and have a range of 20 to 25 miles per charge. Scoot has recently become eas-

Figure 2: The evolution of carsharing in the Bay Area. Photo: Nicolas Vollmer, Flickr

ier to use, as the City of San Francisco has developed a flexible one-way parking policy to accommodate Scoot in business and residential districts—potentially a model for aspects of a one-way carshare parking policy.

Bikesharing is also growing in the Bay Area. Ford Go Bike, the region's largest system, has expanded to more than 7,000 bikes with locations in San Francisco, the East Bay cities of Oakland, Berkeley, and Emeryville, and San Jose. Additionally, several dockless bikeshare providers have arrived in the region, including Spin and Jump.

2.2 Opportunities and Challenges by Carshare Model

Carsharing continues to evolve in the Bay Area, driven by private sector innovation, policy changes, increasing population, and a growing demand for alternatives to traditional car ownership. Different carshare models are responding to these changes in different ways. Mergers and acquisitions across many shared mobility providers and automakers have also given rise to new hybrid services that combine elements of carsharing, carpooling, and ride-hailing.

The following is a brief description of each carshare model, a breakdown of the models' specific strengths and challenges, and the context where each generally works best.

- **Round-Trip Carshare:** Round-trip, or "traditional," carsharing, which requires users to borrow and return vehicles at the same location, continues to play an important

role in the Bay Area, serving approximately 100,000 users with nearly 1,000 vehicles. Round-trip carsharing works well in most communities, although the density of vehicles may vary by geographic type. In larger urban areas, for example, multiple carshare vehicles or groups of vehicles may be available within just a few block radii, while in smaller towns or suburban centers, round-trip carshare vehicles may need to be strategically placed to capitalize on locations with a strong user base, such as pockets of dense housing, rail stations, and employment centers. When round-trip carsharing is placed in a lower density environment, it often needs an anchor tenant that can guarantee a certain level of usage to support the costs of locating the vehicles.

Given both the paucity of public charging infrastructure and the round-trip model's dominant role in the marketplace, almost all electric carsharing vehicles have until recently operated within round-trip services, which can reliably provide a charger at a vehicle's home base. This model may be extended for fleet-based carshare vehicles, especially those primarily made available as daytime vehicles for commuters who get to work by means other than their own car.

- **Peer-to-Peer (P2P) Carshare:** P2P is similar to round-trip carsharing, in that users must return to the point of origin at the end of their trip. The difference is that the service's owner-members make their privately-owned vehicles available for sharing with renter-members, making use of excess vehicle capacity that would otherwise go unused. This model can also act as a revenue stream for the vehicle owners, helping offset the cost of ownership or parking. Its cars often come with parking "built in," since many owners already have access to an on- or off-street parking spot for their car. As mentioned in the previous section, Getaround acquired 150 vehicles and their attendant users with their acquisition of City CarShare in San Francisco. In the course of a Chicago-area pilot of P2P carsharing in a variety of urban contexts, SUMC found that lower-density areas may provide similar utilization challenges for P2P car sharing as they do to other models. However, since the P2P model relies less on a given vehicle's utilization level than do other commercial models (where the costs of the vehicle and its location fall entirely on the private operator, rather than being shared by owner and operator), this land-use based challenge may be less of an impediment in P2P than in the other models.
- **One-Way Carshare:** Since its introduction, one-way carsharing has continued to grow in the Bay Area and elsewhere. One-way carsharing works best in dense neighborhoods and urban centers since it needs a critical mass of users to meet demand and avoid costly rebalancing measures (i.e., the operator's movement of cars from low-demand areas to places where they are more likely to be picked up). There are two main types of one-way carsharing:
    - In free-floating carshare, a fleet of one-way vehicles can be located and reserved by app, then picked up or parked at any legal parking spot within a specific geographic zone (often an entire municipality).

- In point-to-point carsharing, users park at any of a number of designated locations. Point-to-point arrangements are more common for one-way EV carsharing since the vehicle needs to be parked at charging stations between trips. This kind of carsharing typically works best when there are many destinations that are in a relatively short, two- to four-mile range of one another.

Both types of one-way carsharing also work well as first/last mile solutions at rail stations and other transportation centers. In these cases, having access to one-way carsharing could potentially make the difference between someone driving a personal vehicle for both sides of a work trip or choosing to combine other shared modes with public transit. SUMC research suggests that use of carsharing as one of multiple shared modes is associated with greater transit use than people who use transit alone.[2]

- **Subscription Models:** Several automakers are exploring subscription-based "carshare" services, although these are actually somewhere between a vehicle lease and traditional carsharing models, with monthly rather than hourly units of rental and no long-term commitment like a traditional lease. Like carsharing, these models bundle other costs into the subscription price, like insurance coverage, maintenance, and road hazard protection. Several automakers, including Hyundai, Cadillac, and BMW, are exploring this approach. While the model may bear watching as a way for users to avoid the sunk cost of a car purchase or lease, while also providing readier access to newer, more fuel efficient or non-internal combustion vehicles, at this point high monthly prices for the services (often several times the cost of a lease for a similar vehicle) limit their utility and cost-effectiveness for most users, leaving them instead as a niche service for high-income drivers who don't want to commit to a vehicle purchase.

2.3 Regional Opportunities and Challenges

The Bay Area has overall opportunities and challenges that impact all models and the growth of carsharing overall.

Opportunities

- Relatively dense residential and commercial areas that could theoretically support carsharing but that do not yet have services
- Significant number of carshare operators already active in the region and an active tech industry
- Relative success of peer-to-peer carsharing compared with other markets
- Strong leadership by some governments and public entities, such as Oakland, Berkeley, Contra Costa TDM, and Palo Alto
- Many residents prefer car-free/light lifestyles and have an affinity for environmental

2 Murphy, C. and Feigon, S., 2016. Shared Mobility and the Transformation of Public Transit. Research Report 188, Transit Cooperative Research Program.

issues, especially Millennials. This cohort might only want access to a vehicle for occasional errands or trips, and is already adept at making use of technology-mediated solutions.[3]

- State funding sources and leadership on matters related to climate change mitigation

Challenges

- Loss of City CarShare, a longstanding community asset, whose members may have lost trust in carshare or found other ways of getting around after it closed its door
- Many low-density areas that are not well served by transit and have high car ownership
- EV infrastructure not yet comprehensive enough to support widespread electric carsharing, especially free-floating
- Patchwork of rules and ordinances throughout the Bay Area

The opportunity analysis shows where carsharing is a practical option, highlighting locations that have carshare-supportive characteristics and should be considered further for new or expanded service. On the other hand, many communities lack the necessary land-use characteristics and transportation context, including household and employment density, vehicle ownership levels, walkability, and transit access, to currently support carsharing. While in some places these challenges are marginal and might be overcome through public subsidies or the kinds of policy supports and strategies outlined elsewhere in this report, carsharing is simply not viable in every community.

3 Recent years have seen a rebound in the amount that Americans drive, measured as VMT, after nearly a decade of trending downward. However, scholars also point to a trend where Millennials are driving less than their preceding cohort. See "3.2 Trillion Miles Driven on U.S. Roads In 2016." FHWA Press Release FHWA 04-17. https://www.fhwa.dot.gov/pressroom/fhwa1704.cfm. Ralph, K. M. (2017). Multimodal millennials? The impact of millennials' travel behavior on future personal vehicle travel. Energy Strategy Reviews, 5, 59-65.

3.0 Stakeholder Input

Stakeholder engagement was undertaken through two means, the first being a Carsharing Implementation Strategy Workshop on September 18th, 2017, and the second comprising a subsequent series of one-on-one interviews with key stakeholders and carshare service providers. The dialogue provided an opportunity for carshare operators and public agency staff to share challenges in working with each other and brainstorm solutions.

3.1 Carsharing Implementation Strategy Workshop

A workshop was conducted to determine how best to expand carsharing to more residents and communities in the Bay Area and to offer an opportunity for staff from local governments to learn more about carsharing and provide input regarding how carsharing can be more successful in their communities. More than 20 Bay Area local governments and transportation agencies were represented at the workshop.

Representatives from Gig Car Share, Zipcar, Getaround, ReachNow, Maven, and car2go attended the workshop to share their insights. Companies were invited to participate in the workshop based on their current or past presence in the Bay Area, potential willingness to enter the Bay Area market, and the likelihood, based on the perceptions of the consultant team, that they would offer useful information for the study and workshop attendees.

The workshop included a general overview of the state of carsharing in the Bay Area, presentations from the cities of Oakland and San Mateo, a panel discussion with representatives from the invited carshare companies, and breakout discussions. The panel and breakout discussion provided direction to the study. Key findings and insights included:

- There was a consensus that local governments would benefit from the creation of model carshare ordinances that municipalities could opt into, created by county agencies or MTC.
- Carshare operators requested greater regional standardization of requests for proposals (RFPs) to make responding to RFPs simpler.
- Carshare operators would benefit from government support for marketing efforts and the integration of carshare information into travel program offerings and travel tools.
- Government agencies said a simplification of MTC grants would be helpful and that they would prefer if grants could go directly to private companies to allow government agencies to avoid grant management.
- Attendees said that if cities use carshare vehicles for their fleets and make them available to residents on nights and weekends, it would likely lead to increased availability of carshare vehicles.
- City provision of on-street parking spaces for carshare vehicles was cited as a potential benefit by carshare operators.
- Cities requested more education and information sharing about carsharing in the form of webinars, presentations to city councils, and coordination with transportation management associations.
- Attendees said the integration of requirements for the provision of carshare parking spaces, carshare memberships, and unbun-

dled parking into the development review process could increase the use of carsharing.

The full summary of the workshop can be found in Appendix A.

3.2 Interviews

Upon conclusion of the workshop and development of draft recommendations, a series of one-on-one interviews were conducted with key stakeholders and carshare operators. The interviews were conducted to share the draft recommendations and obtain input that could be used to test and refine the recommendations.

The interviews were conducted by staff members from SUMC and MTC and were held with the following individuals:

- Franco Arieta, Regional General Manager, Zipcar
- Lynette Busby, Executive Director and Chris Romano, Contra Costa Centre
- Peter Dempster, Strategy and Market Development, ReachNow
- Dermot Hikisch, Head of New Markets, Gig Car Share
- Rachel DiFranco, Sustainability Manager, and Daniel Schoenholz, Deputy Community Development Director, City of Fremont
- Krute Singa, Climate Program Manager, Metropolitan Transportation Commission

Key findings from the interviews included the following:

- The carshare operators were amenable to the one-stop shop strategy, as explained in the next section. They are especially eager for consistent regulations and permitting processes across the region.
- The agency interviewees also supported a consistent permitting process.
- Lower density areas are best served by a contiguous network.
- The City of Fremont, based on difficulties implementing a solar facilities grant, suggested that coordination between municipalities requires additional legal coordination and oversight.
- The Contra Costa Centre Transit Village interview highlighted the importance of providing in-person education for shared-use mobility, especially carsharing.

4.0 Recommended Strategies to Expand Carsharing

The consultant team, in coordination with MTC staff, utilized findings from the state of carsharing in the Bay Area analysis, input received during the carsharing implementation strategy workshop, input received during one-on-one interviews with key stakeholders, and the knowledge of the consultant team and MTC staff to develop a set of strategies that can be implemented to increase the carshare market in the Bay Area. The overarching strategy, which will support the others, is the creation of a regional "one-stop shop" to facilitate the expansion of carsharing in a way that benefits the region in an equitable and effective manner. This strategy can serve as an umbrella for all the others; however, each strategy can be implemented individually and without the one-stop shop if so desired by MTC and its partners.

The second strategy is the incorporation of carsharing into development review processes and transportation demand management (TDM) plans. Including on-site vehicles at more locations can help reduce SOV trips, and the deployment of EVs at more dispersed locations could help build out the availability of charging infrastructure alongside residential and commercial development.

Both public and private fleets can reduce their vehicle numbers and increase their utilization by using carsharing vehicles. The third strategy uses this as an opportunity to both expand carsharing membership and provide additional EV infrastructure.

The interfaces for trip planning, transportation information, and Mobility as a Service (MaaS) apps often do not include carsharing options. The fourth strategy addresses the need to increase the recognition of carsharing by making it discoverable and visible to users of these technologies.

The fifth strategy explicitly addresses equity for transportation users in the rapidly growing Bay Area by tying carsharing to residential development in a way analogous to TDM for corporate campuses.

Finally, while the one-stop shop model proposes a push-pull scenario with a regional exchange of parking spaces (detailed in Option 1 below), the location of these vehicles could further encourage sustainable transportation options. Placing shared vehicles of all types adjacent to transit at mobility hubs, which would also include travel information and in-person outreach, would make the full menu of non-SOV travel choices more widely available.

The project team calculated the likely impact implementation of the recommendations would have on GHG emissions. The calculations were based on the 16 municipalities identified in Plan Bay Area 2040 as top cities for housing growth in the coming decades. These cities are the most likely to be able to support carshare growth in the coming years.

Three growth scenarios were created that estimated GHG emission reductions based on carshare adoption rates of three, five, and ten

percent among eligible drivers in the 16 communities. To provide context, the city of San Francisco is very close to achieving an adoption rate of three percent. The adoption rate scenarios were then used to estimate an annual range of GHG reductions of 3,990 to 13,300 metric tons of carbon dioxide equivalent (CO2e).

The project team believes that the most likely adoption rate is between three and five percent within the next 5 to 10 years. Achieving an adoption rate of three percent across the 16 cities would require increasing the number of carshare vehicles within those cities by approximately 20%. Achieving the higher adoption rate of five percent would require increasing the number of carshare vehicles by approximately 30%. Within the adoption rate of three to five percent, the annual GHG reductions would likely be between 3,990 and 6,650 metric tons of CO2e. A fuller discussion of the likely impacts is provided in Section 5.

Strategy A: Create a Regional "One-Stop Shop"

The purpose of the one-stop shop is to facilitate the creation, maintenance, and marketing of a "one-stop shop" that would offer a set of tools and associated educational efforts to cities that would enable quicker startup and consistent policies for carshare operators looking to enter the market or expand services. Through the workshop and follow-up interviews, operators and municipalities said that a lack of coherent policy (e.g., permits and placement) and basic awareness about carsharing are barriers for carsharing expansion, especially in opportunity areas.

The concept of the one-stop shop is for MTC to help build a coherent regional policy framework, general awareness, and availability of carsharing by working with local governments throughout the Bay Area to develop a set of model regulations, marketing materials, and procurement procedures that would include the following elements:

- Standardized regulations across jurisdictions, based on model statutes and administrative guidelines, for the provision of city-controlled parking spaces to one-way and round-trip carshare operators
- Standardized signage for identifying the location of carshare parking spaces and vehicles
- Regional strategy, building on existing efforts such as in Oakland, of requiring carsharing parking spaces and vehicles in low-income neighborhoods
- Standardized policies to support the routine placement of carshare locations at transit stations
- Standardized requests for proposals (RFPs) that municipalities can use to recruit carshare providers to their communities or to provide fleet replacement services or the facilitation by MTC of multi-jurisdictional RFPs for carshare service provision
- Educational materials regarding the benefits of carsharing
- A website that contains sample regulations (e.g., operation of one-way carsharing), marketing materials, and other guidance created by MTC
- Carsharing focused training and ongoing technical assistance for local government staff from an MTC staff person

These materials and services would be made available to participating local governments with the understanding that they would be used with no or only minor modifications. By creating a more uniform policy and procurement landscape, cities limit their own staff costs in the development of local policies, reduce cross-jurisdictional friction for carshare operators and ease their entry into new markets, while easing barriers for innovations like one-way carsharing. Uniform multi-jurisdictional agreements increase the utility of one-way carsharing across the entire region; when availability varies city by city, users may not be able to start and end trips in different municipalities, reducing the dependability of the model and limiting its travel demand management and vehicle-shedding effects. Policy harmonization is essential to creating a seamless, cohesive set of regional travel options that can rival the convenience of solo driving.

The one-stop shop would use the desirability of access to prime locations in developed carsharing markets like Berkeley, Oakland, and San Francisco to provide incentives for carshare organizations to add vehicles in cities or neighborhoods with lower density or less developed markets. Such a scenario would require coordination between numerous Bay Area municipalities. Three options have been identified for the one-stop shop that require varying levels of regional coordination and result in varying levels of impact. All three scenarios depend on the creation of a clearinghouse of information that would be developed and maintained by MTC. The greater the level of cooperation, the greater the projected increase in carsharing. The scenarios are presented in descending order of impact:

Option 1: The first option, which would likely result in the most carsharing vehicles and members, would entail a regional policy partnership between multiple municipalities. As part of this option, and with all options, MTC would facilitate the creation of a central regional clearinghouse with coherent policies regarding carsharing operations. The clearinghouse would include the items listed above.

This option maximizes regional cooperation and likely impacts by creating a regional agreement regarding the provision of carshare parking and access. In exchange for a package of incentives, including access to premium parking spots in the three most important Bay Area carsharing markets for operators (San Francisco, Oakland, and Berkeley), the operators would agree to place vehicles in lower density markets. Participating municipalities would provide access to premium parking locations in their localities. Spots and vehicles would be apportioned among the largest 10-15 Bay Area municipalities beyond San Francisco, Oakland, and Berkeley.

Option 2: The second option springs from discussions with MTC and a carsharing grantee. Although a regional agreement is ideal (or at least one whose organization takes place at the regional level, regardless of the overall participation level), the size of the region and number of jurisdictions makes its feasibility a challenge. Representatives from agencies and municipalities suggested that intra-county cooperation was more practical in the short term and would allow the program to focus on parts of the region with the most likelihood of success. Thus, in this option, the county management associations (CMAs), rather than the region,

are the key level of organization for the parking apportionment efforts and administration of the multi-jurisdictional programs. The central regional clearinghouse, including overall development of materials and policies, would remain with MTC.

Option 3: The third option, which would correlate to the lowest overall growth, but also minimize the need for regional partnerships, would consist only of the central regional clearinghouse, maintained by MTC. The model code would still move the region toward a uniform policy environment—a central concern of the carshare operators—and coordinated signage and branding would serve to raise awareness for the mode.

A.1 Guiding Insight from Research and Findings

Interjurisdictional and regional coordination is perhaps the biggest obstacle facing these strategies, but an example of the former is already found in the free-floating carsharing agreements between Oakland and Berkeley. Although it is between transit agencies, the Clipper Program Fund offers a framework for memoranda of understanding.

A.2 How the Strategy Could Work

The one-stop shop in each option would be hosted by MTC. The case for the clearinghouse is both a matter of administrative efficiency and technical assistance for carrying out environmental and equity mandates. The first two scenarios would entail the relevant jurisdictions joining a committee to agree on parking spaces and policies.

A.2.1 Pros

- All scenarios: Reduce duplicative processes, streamline time-consuming processes for carshare operators, reduce staff overhead for participating jurisdictions, and encourage wider deployment of carshare in the region. Encourage private operators to expand their reach to more localities by producing greater predictability across jurisdictions.
- Options 2 and 3: Provide a uniform policy, while preserving local autonomy.
- Will target those areas that are best suited for carsharing using the Opportunity Analysis as a basis for geographic focus.

A.2.2 Cons

- All scenarios: Require additional research and administrative work by at least one FTE position at MTC.
- Marketing to stakeholders throughout the region required for buy-in.
- Options 2 and 3: would be non-binding on a regional level, so duplication might occur.
- Options 2 and 3: less flexibility in vehicle placement and incentives available in a given city, due to smaller pools of participating jurisdictions.

A.3 Moving to Implementation

1. Create model legislation: MTC should take the lead in developing model statutory language and local administrative procedures for carshare operations that covers both round-trip and one-way carsharing. The model legislation should be based on the cross-jurisdictional legislation that already exists in Berkeley and Oakland. Carsharing programs and policies in those cities

are demonstrated successes and their duplication throughout the region would provide further consistency for carshare operators. Items that should be covered include:

- Parking reimbursement rates and procedures
- Processes for designating the number, location, and priority of dedicated or available carshare parking spots
- A common set of designs for signage and marketing materials that will produce a coherent regional identity for carsharing

The process should include representatives from local governments and carshare operators. It should identify incentives that cities can provide to carshare operators to encourage the provision of service in areas where land use and demographics are not necessarily ideal. This can be done through the transportation demand management requirements discussed in the recommendation below.

2. Educate local governments and form regional carshare consortium for ongoing information exchange: Early in the process, MTC should conduct a series of events with local governments to educate them about the regional carsharing strategy and its associated policy guidance, guide them in determining whether carsharing would be an effective strategy in their locales, and inform them about the support and policy guidance available through the one-stop-shop. The events should include representatives from cities that have passed legislation and have successful carshare programs. An MTC staff person, or outside consultant, should be assigned to provide ongoing support to cities and all applicable materials should be available through the MTC website.

These initial educational events can provide the basis for the development of a carshare consortium that includes local government staff, community groups, and carshare operators. The consortium could hold regular meetings, which would offer an opportunity for the exchange of ideas. Between the meetings, an online forum could be established to answer questions and to provide information related to the administration of carshare programs.

3. Evaluate and refine: Educational events should be evaluated through post-program surveys typical to training sessions. MTC should reach out to cities that implement the model legislation to determine lessons learned and identify potential refinements. Ideally, 16-20 cities will adopt the model legislation within 5 years of its development. If that goal is not met or the region is not on target to accomplish it within 3 years, MTC staff should reach out to cities to determine why they are not adopting the legislation and what modifications can be made to encourage greater adoption.

A.4 Budget Estimate

- Staffing: 1 FTE for scenarios 2 and 3, and 2 FTE for scenario 1.[4] For all scenarios, 1 FTE would be required for administering and coordinating the one-stop shop clearinghouse on site. For Scenario 1, the second

4 According to the MTC's Comprehensive Annual Report: For the Fiscal Years Ended June 30, 2017 and June 30, 2016, page iv, as of July 1, 2017 there were 5 vacancies in the Integrated Planning Department. Full time equivalent resources might be applied, as those vacancies are filled.

FTE would be required for additional on-site local assistance for both carshare parking coordination and outreach.

- Funding Sources: Federal: Congestion Mitigation and Air Quality Improvement (CMAQ) funds; State: Transit Assistance Fund for regional coordination; Additional fees from carsharing permits.[5]
- Timeline Estimate: Research and creation of model statute, 4-6 months. Education of local governments, ongoing starting at 4 months. Implementation starting at 7-9 months. Evaluation and refinement ongoing.

A.5 Evaluation

- Likely impacts on GHG emissions: Depends on uptake rates but can be tied to vehicle shedding rates from membership increases.
- How to quantify the impact: Determine how many jurisdictions adopt model policies annually through year 5. Determine number of vehicles placed and personal vehicles shed as a result.
- Outstanding questions: The level of buy-in to this strategy is critical for the implementation of the other strategies. Also, how does the one-stop shop exist in relation to other modes?

Strategy B: Integrate Carshare Incentives into the Development Review Process and TDM Plans

The provision of carsharing spaces and memberships should be encouraged through the development review process for multi-family

residential, mixed-use, and commercial developments and through regulations or incentives that encourage the provision of transportation demand management (TDM) programs. MTC can create materials and provide educational assistance to local governments to help them integrate carshare requirements into development review and TDM ordinances. This can be done as part of the one-stop shop or as a stand-alone effort.

The State of California recently passed legislation limiting local imposition of parking minimums for streamlined multifamily developments within 1/2-mile of transit or within one block of a carshare vehicle (SB-35, Chap. 366, 2017). Local governments may affect parking by encouraging carsharing to extend the reach of these TOD-type developments. Additionally, municipalities and counties could work with community development corporations to locate carsharing at transit-disadvantaged areas, while freeing parking for additional housing.

Also, carsharing is not included as a central component of the menu of current transpor-

5 In their ordinances and reports, most municipal programs explicitly tie fees to recovery of administrative costs. See SFMTA's Car Sharing Policy and Pilot Project: July 2013, page 12, for a local explanation of the policy.

tation demand management options (e.g., guaranteed ride home, transit benefits, travel planning), perhaps because a single occupancy commute, regardless of whether it is taken in a private or carshare vehicle, does not reduce either VMT or GHG. However, if an on-site shared vehicle might be integrated into guaranteed ride programs to provide flexibility for transit commuters who might need to travel to an intermediate destination, e.g., going to school to retrieve a child. Even those who use round-trip vehicles as a solo commuter could "flex" a low- or zero-emission vehicle, as discussed in the fleet section below, for midday utilization by others for errands or meetings. Relevant model code for TDM requirements could be included in a model code provided as part of the one-stop-shop, above, but the strategy also stands on its own.

B.1 Guiding Insight from Research and Findings

Cervero examined how residents of TODs, who self-selected as transit users—i.e., chose to live there at least in some part due to transit—made fewer vehicle trips per unit, but in some cases (near a BART station) actually occupied more parking spaces than comparable developments.[6] He argues that, as of that writing, carsharing was not widely utilized in TODs, even though it would help reduce the need for parking space.

B.2 Case Studies

Through discussions with the Contra Costa Centre Transit Village (a TMA) and UC Irvine ZevNet (an EV carsharing program), it was found that a convenient—and in the case of Contra Costa Centre, free—on-site carsharing program encourages non-SOV mode share.[7]

Contra Costa Centre Transit Village, a home-grown and self-administered program that is free to commercial tenants, is an ambitious program. It is important to note that it was designed, with reduced off-street parking, around a BART station. The free and convenient on-site transportation, aggressively marketed commuter benefits program, and staffing are funded by a special assessment agreed to by the commercial tenants.

The UC Irvine ZevNet EV carsharing program was a 2002-2016 partnership between the university's Advanced Power and Energy Program, the City of Irvine, Zipcar, and vehicle manufacturers at various points through the program. The City and University placed chargers and vehicles at their transit center and on campus to foster first/last mile connections for commuters and reverse commuters. The program expanded to include on-site stations at up to eight large corporations, where they were utilized as both first/last mile vehicles and mid-day errand vehicles.

---

6 Cervero, R. (2009) "TOD and Carsharing: A Natural Marriage." Access 35 (Fall), 25-29. https://www.accessmagazine.org/wp-content/uploads/sites/7/2016/01/access35_TOD_and_Carsharing.pdf

7 Kennedy, J (2010). Contra Costa Centre Financing Transit Oriented Development, presented at Rail-Volution: Financing the Public Realm, October 20: http://railvolution.org/rv2010_pdfs/20102010_10am_FinPubRm_Kennedy.pdf. For ZevNet, see Heling, M. G., Saphores, J. D., & Samuelson, G. S. (2009, January). User characteristics and reponses to a shared-use station car program: An analysis of ZEV• NET in Orange County, CA. In CA, presented at the 88th Annual Meeting of the Transportation Research Board, Washington DC.

B.3 How the Strategy Could Work

Carsharing facilities are now counted as transit for the purposes of TOD buffers, so a public facility can be used to provide carsharing vehicles. Jurisdictions that have a TDM requirement could add model code to require carsharing for relevant developments. The City of Palo Alto's recently updated TDM ordinance includes a provision for carsharing.

B.3.1 Pros

- Offers further incentive for self-selecting TOD residents to not own a private vehicle.
- Developers can devote more square footage to leasable space.
- While some of the costs are borne by the developers, a successful TDM plan is an amenity that results in lower demand for expensive off-street parking.
- If EVs are used, the program can encourage sustainable transportation to work, reduce emissions for emergency ride home-type trips, and increase awareness of the mode.

B.3.2 Cons

- Requires local political will, and if no model ordinance, can require considerable administrative resources.
- On-site vehicles might only be available to tenants/residents.
- Large buildings, developments, or companies will need to devote staffing resources to TDM program management and coordination with carshare providers. Public agencies must devote staffing resources to enforcement of policies.

B.4 Moving to Implementation

1. Create model requirements: Model requirements that support carsharing as part of TDM/TOD regulations should be created for two types of governments: (1) those that already have TOD/TDM requirements but lack carsharing requirements or incentives and (2) cities that do not have any existing TOD/TDM requirements. This effort should be conducted as part of MTC's effort to support communities with the adoption of VMT impact analyses for new development that will replace vehicle trip impact analyses. This effort is already under way and integrates well with this recommendation.

2. Educate local governments: As noted above, education should occur through outreach efforts associated with the transition from vehicle trip to VMT impacts. In addition to those efforts, information on TOD/TDM and the integration of carsharing should be shared during outreach efforts associated with the one-stop shop.

3. Evaluate and refine: Educational events should be evaluated in coordination with other one-stop shop efforts. Model legislation adoption should also be monitored in the same way as other one-stop shop efforts.

B.5 Budget Estimate

- Staffing: If the one-stop shop is established, no additional agency/public staffing for all scenarios. If not, ½ FTE will be required.
- Funding sources: For transit options to bring on-site carsharing users to either a public or private site, funding might come from Bay Area Air Quality Management District's (Air District) Transportation Fund for Clean Air (TFCA) Regional Fund. Both existing shut-

tles/feeder buses and pilot trip reduction programs are eligible for the program.

- Timeline: With any new TDM agreements. Also, offered as option in one-stop shop for existing transportation management associations. Use Palo Alto as an example.

B.6 Evaluation

- Likely impact on GHG emissions: Direct.
- How to quantify the impact: For TDM sites, measure baseline mode shares before TDM measures are applied, then periodically (e.g., annually, semi-annually) measure ongoing mode shift using the same evaluation method.
- Outstanding questions: Transit infrastructure, whether public or private, needs to exist for the errand car model to work.

Strategy C: Transition Local Fleet Operations to Carsharing Operators

To increase utilization of carsharing services and reduce public investment in fleet vehicle ownership and maintenance, encourage municipalities to transfer part or all of their fleet operations to a carshare-based model with participating providers. In this model, public agencies would provide carsharing memberships to employees who are eligible for motor-pool usage, and encourage as many motor-pool trips as possible to take place using carsharing vehicles (either those available to the general public or a dedicated municipal fleet). At the same time, the agencies would begin to reduce the size of their conventional motor-pool fleets.

This would encourage overall carsharing utilization, reduce public motor-pool costs, decrease parking pressure at local government facilities since access to vehicles reduces solo commuting (if carsharing vehicles are located nearby), and would provide an alternative for cities like Fremont that do not want to convert their fleet yet. Fleet integration can range from back-end reservation management of existing municipal fleets, to flex systems that use both carsharing vehicles and conventional motor-pool fleets, to larger contracts in which the operators also provide, manage, and maintain the entire fleet. Electric Vehicle (EV) adoption is moving quickly, yet requires additional infrastructure, which offers an additional argument for the highest level of regional coordination, in Scenario 1.

C.1 Guiding Insight from Research and Findings

Contracting carsharing for municipal fleets offers savings and efficiency to the municipality. In the case of EV carsharing, it also offers a way to build infrastructure for the wider carsharing environment. Our discussion with Fremont revealed that smaller cities might be hesitant to enter into these agreements. Their recent experience with the Regional Renewable Energy Procurement Project (R-REP) informs

their approach. While they successfully installed additional solar capacity, it strained their staff resources. Their concerns regarding carsharing specifically are largely due to their city hall's and fleet operations' locations in low-density, fairly unwalkable areas not conducive to car sharing, they might revisit the issue when they move the latter, in coming years. Other cities, however, might use this strategy to further leverage EV adoption.

C.2 Case Study

The City of Los Angeles Police Department, on its regular funding schedule, recently procured electric vehicles (EV) for its civilian and routine assignment motor pool, on a three-year lease. While the police department vehicles are not available for wider use, other departments could conceivably make available their fleet vehicles to government employees. They additionally used their projected operations savings to purchase charging infrastructure that can be used by other city vehicles and bolster the EV infrastructure.

C.3 How the Strategy Could Work

The ideal system would automatically enroll qualified municipal employees in carsharing (outside their official capacity). It would make fleet vehicles available for sharing (to municipal employees or the general public) during off hours.

C.3.1 Pros

- For operators, incentive is a larger, built-in membership base and reduced cost of providing public carshare vehicles in locations where they already have fleet business.
- The effect would be magnified for EV

C.3.2 Cons

- More difficult for smaller cities
- EV implementation requires additional capital spending and partnerships

C.4 Moving to Implementation

1. Create guidance for local governments: MTC should develop materials that will help government agencies understand and address the issues associated with converting all or part of their vehicle fleets to carshare fleets. Issues that should be addressed within the materials include: estimating costs and benefits, insurance and liability issues, determining employee eligibility to use vehicles, employee use of vehicles for non-work trips, potential union issues, guaranteeing availability, public access to vehicles, employee and community education, options and issues associated with securing an EV fleet, and funding options for EV infrastructure. In addition, information should be provided on lessons learned from other government agencies that have converted all or part of their fleets to carshare, technology options available for fleet management, potential service providers, and sample requests for proposals.

2. Educate local governments: All guidance materials should be included in the one-stop shop discussed above and education efforts can be integrated with other elements of the one-stop shop including the model carshare and TDM legislation.

3. Evaluate and refine: Educational events should be evaluated in coordination with other one-stop shop efforts. Policy adoption should

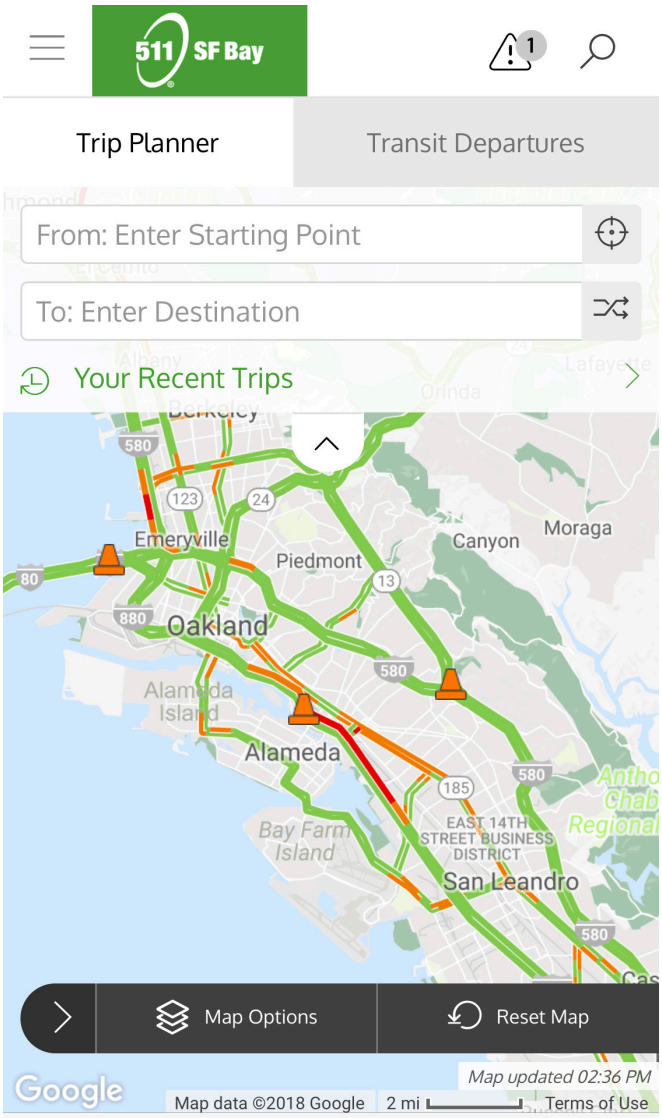
also be monitored to determine if government agencies convert all or part of their fleets to carshare vehicles. If policy adoption does not occur, MTC staff should reach out to cities to determine why they are not adopting the model policy and what modifications can be made to encourage greater adoption.

C.5 Budget Estimate

- Staffing: No additional staffing, if one-stop shop is established.
- Funding sources: Existing fleet budget. Additional costs for the EV fleet could be borne by the Bay Area Air Quality Management District's (Air District) Transportation Fund for Clean Air (TFCA) Regional Fund, which also funds light duty EV fleets that are available to the public.
- Timeline: With launch of one-stop shop

C.6 Evaluation

- Likely impact on GHG emissions: Direct
- How to Quantify: If the city keeps records of fleet VMT and utilization, can easily quantify against future use
- Outstanding questions: Opening shared government fleet vehicles to government employees for personal use might require extra research and likely changes in regulations. However, simply providing government employees access to a larger general-public carsharing fleet to reduce the need for dedicated government vehicles is less complicated.



Strategy D: Integrate Carsharing into Trip Planning, Transportation Information, and Mobility as a Service Apps

The rise of trip planning and Mobility as a Service (MaaS) tools, in which multiple modes are shown to a user planning a given trip, with the option of a single payment portal, has the potential to greatly reduce the perceived friction of non-SOV travel. Work should be done to integrate carshare information into trip planning and MaaS apps.

D.1 Guiding Insight from Research and Findings

While integration of transit and other public-private partnerships, such as bikeshare, is key to many trip planning apps, carsharing appears to be a lower priority for many apps, particularly those of the MaaS types, which are in their infancy for use in the United States. Including carsharing in the MaaS environment will help sustain it as a viable mode. However, as has been seen with trip planning pilots for transportation network companies (e.g., Uber and Lyft), sometimes private companies are reluctant to share a platform with competing providers.

D.2 Case Study

Whim, a Finnish MaaS provider that is expanding to new markets, has car subscriptions and rentals as an add-on feature to its service. Another trip planner, called the Transit App, might also serve as a model for a more iterative path to integrating mobility services. Beginning as a real-time transit tracker and GTFS-based trip planner, Transit App began adding the ability to locate and book other shared modes through its interface, including carsharing, TNCs, and both docked and dockless bikeshare services where these are available. Pinellas Suncoast Transit Authority recently made Transit App its official trip planning tool, and a number of other agencies around the country endorse its use.

D.3 How the Strategy Could Work

The carsharing operators would provide a live data feed of the vehicle locations that would feed into a MaaS or trip planning app, and sign a contract for single payment functionality on the app. The MaaS strategy would be most attractive to one-way carsharing providers, as the origins and destinations would work only in those areas where they are qualified to park. The same would hold true for EV carsharing, as with docked bikesharing, available stations would be included in travel considerations.

D.3.1 Pros

- Higher visibility for carsharing as a mode and an alternative to SOV trips.
- The effect would be magnified for EVs.

D.3.2 Cons

Requires negotiation between many parties.

D.4 Moving to Implementation

1. Create Guidance for carshare providers and MaaS vendors: The one-stop shop would provide a clearinghouse of active MaaS vendors and some of their basic requirements of transportation providers and vice versa.

2. Educate local governments: MaaS efforts will be highlighted in coordinated marketing campaigns.

3. Evaluate and refine: While MTC might not have direct contact with the agreements between carsharing entities, it should be appraised, through transit agency partnerships, of the status of carsharing operators' status.

D.5 Budget

- Staffing: Can be covered by staff associated with one-stop shop
- Funding sources: Funding is only necessary if MTC creates its own app, otherwise costs would be covered by carshare operators and app developers.

- Timeline: Determined by MaaS providers, or 2019.

D.6 Evaluation

- Likely impact on GHG emissions: Indirect
- How to Quantify: Mode shift per service area
- Outstanding questions: outside of the one-stop shop arrangement, can MTC encourage and coordinate the local partners? The capital costs might prove prohibitive.

Strategy E: Increase the Number of Car-share Vehicles at Transit/Mobility Hubs around BART and Bus Stations

Mobility hubs provide highly visible intermodal connections that encourage travel mode shifts. BART is already moving toward intermodal areas at stations in smaller cities—including Fremont and Walnut Creek—for curbside TNC/taxi, bus, and private bicycle (BikeLink storage) parking and drop off.[8] Some MTC carsharing pilots are already located at BART stations to facilitate first/last mile connections. These locations can also support the expansion of EV charging infrastructure. The mobility hub would provide additional carsharing, bikesharing, and various EV spaces using a coherent, designed space that takes advantage of the one-stop shop's coordinated signage and marketing. Critically, the mobility hubs could also be staffed, providing opportunities for community around, perhaps, a newsstand. This resulting word-of-mouth marketing provides the best opportunity to educate users about mobility options.

E.1 Guiding Insight from Research and Findings

The city of Oakland included provisions for mobility hub pilot projects in its 2016 Smart Cities grant application. The study upon which it is based includes an extensive methodology for locating the sites to benefit disadvantaged communities, environmentally and economically.[9] While no budget was offered in either document, the outline provides a thorough vision for the implementation of the plan. The carshare operators that were interviewed as part of this study were amenable to the idea. While BART is already moving towards a mobility hub model, it can be expanded to other agencies, made more uniform, and improved.

8 "Building a Better BART". 2014. page 26: https://www.bart.gov/sites/default/files/docs/BART Building a Better BART Executive Summary_0.pdf#page=26 and "BART Station Access Policy Implementation Key," (2016): https://www.bart.gov/sites/default/files/docs/Station%20Typology%20Map%202016-06-09%20Final.pdf

9 Oakland: Smart + Equitable City. 2016. Submitted in response to U.S. Department of Transportation Notice of Funding Opportunity Number DTFH6116RA00002 "Beyond Traffic: The Smart City Challenge". February: https://cms.dot.gov/sites/dot.gov/files/docs/CA%20Oakland.pdf. The study: City of Oakland. 2015. Mobility Hub Suitability Analysis Technical Report. December. http://218consultants.com/wp-content/uploads/2015/12/City-of-Oakland-Mobility-Hub-Suitability-Analysis-Technical-Report.pdf

E.2 Case Study

Our study of mobility hubs in Bremen, Germany found that the mobility hubs helped alleviate pressure on parking, and addressed traffic congestion.[10]

E.3 How the Strategy Could Work

While the one-stop shop could provide a forum for regional coordination of enabling policy and siting for mobility hubs, the bulk of the coordination would occur between local governments, transit agencies, and private operators. The one-stop shop would offer direction on the number of spaces offered, which could be calibrated to the different carsharing scenarios. Likewise, the one-stop shop clearinghouse could provide the relevant model ordinances, signage, and other coordinated marking materials.

E.3.1 Pros

- Opportunity for innovative partnerships between agencies and private operators.
- Offers further visibility for all modes, offering a permanent node for outreach and education.
- Mobility hubs are the physical manifestation of MaaS.
- Spaces could be designed to be "future proof" and flexible for new modes.

E.3.2 Cons

- Mobility hubs in denser areas are difficult to expand if additional spaces are needed.
- Potentially large capital costs.

E.4 Moving to Implementation

1. Secure support from relevant agency (BART/Caltrain/local government) for right of way: Broad integration of carshare vehicles, payment kiosks, and potential EV infrastructure into transit stations will require support from the relevant agency. While working to secure this support, MTC staff should identify unmet needs that relevant agencies may have with regard to the inclusion of carshare vehicles at stations. Potential questions may include reasonable lease rates for spaces, assuring compliance for carshare only parking spaces, processes for the provision of carshare parking spaces when multiple providers request access, liability issues, infrastructure cost sharing, the development of model parking space and infrastructure designs, and staffing of the stations.

2. Support relevant agencies: Assuming the relevant agency agrees to the provision of parking spaces for carshare vehicles in its transit stations, MTC should provide assistance, where requested by relevant agency, to address issues, questions, and needs identified in step 1 above.

3. Assist with securing participation from carshare providers: Upon obtaining agreement from relevant agency to host carshare vehicles and identification of the circumstances under which carshare vehicles will be allowed, MTC should work with local governments to inform them of the program and help them encourage existing and potential carshare providers to offer vehicles through the relevant agency program.

10 See "Build Your Own Mobility Hub: 7 Lessons for Cities from Bremen, Germany." Shared Use Mobility Center: http://shareduse-mobilitycenter.org/news/build-your-own-mobility-hub-7-lessons-for-cities-from-bremen-germany/

4. Evaluate and refine: Assuming BART participation is secured, MTC staff should coordinate with relevant agency staff to track the number of carshare vehicles placed at transit stations throughout the Bay Area. Ideally, vehicle placement should reach the vehicles specified in the growth scenarios within the next 5 years. If this level of placement is not achieved, MTC staff should reach out to local carshare providers and relevant agency officials to determine why growth is not meeting projections and what changes are needed to encourage more carshare vehicles at relevant agency stations.

E.5 Budget Estimate

- Staffing: No additional for MTC. Staffing for the mobility hubs might be for only rush periods and could be covered by a combination of fees to mobility hub tenants and public funding.
- Funding sources: The funding for the basic facilities would come from the relevant capital funds, with partnerships with private providers and potentially transit funds that are available from MTC.

E.6 Evaluation

- Likely impact on GHG emissions: Indirect
- How to Quantify: Mode shift per service area
- Outstanding questions: Outside of the one-stop shop arrangement, can MTC encourage and coordinate the local partners? The capital costs might prove prohibitive.

5.0 Potential Impacts

To estimate capacity for new or expanded carsharing in the Bay Area, SUMC drew from previous research for the Urban Sustainability Directors Network (USDN) that funded SUMC to build the Shared Mobility Toolkit. A component of the toolkit was an opportunity analysis tool for estimating the neighborhood-level capacity to support shared mobility in cities across North America. The opportunity analysis is based on a carshare and bikeshare model that includes several variables that correspond to a neighborhood's likelihood to support shared mobility.[11] While many factors influence the potential for shared mobility, such as the presence of supportive policies and limited or expensive on-street parking, the variables below quantify the extent of existing transit and whether a neighborhood is compact and walkable, and thus likely to provide a physical environment that can support shared mobility:

- Transit access
- Walkability
- Household density
- Employment density
- Existing carshare and bikeshare infrastructure

This analysis suggests that several communities within the Bay Area could support additional carsharing. Three areas are highlighted on the map below:

- Blue areas score high for the ability to support carshare of their own accord.
- Orange indicates areas of medium opportunity, which have some physical and demographic characteristics of neighborhoods that are successful carsharing markets but would likely require more active support as they may fall short in key areas such as transit connectivity or walkability.
- Green represents places that could host first/last mile connections to public transit but are unlikely to be strong carsharing markets on their own.

Discussion of the potential market for carshare in the following section examined only the neighborhoods that ranked as having a high or medium opportunity. While the neighborhoods identified as first/last mile could potentially support some additional shared mobility, they are not a ready market for round-trip carshare. These neighborhoods could hold potential for a one-way carshare market where the users drive a carshare vehicle to the train station and then public transit to complete their trip. But since this model is still largely untested, it is not included in the carshare growth scenarios presented here. A set of maps offering a typology of cities and neighborhoods, along with a summary of their carshare opportunity, are included in Appendix B.

Neighborhoods that scored the highest tended to be urban centers (downtown business districts and the dense, walkable urban neighborhoods adjacent to them), but also include some more suburban town centers, transit station areas, and employment clusters. In many cases, these areas also fell within Priority Development Areas, the places that Bay Area cities have

11 See link for the Opportunity Analysis method: http://sharedusemobilitycenter.org/wp-content/uploads/2016/04/SUMC-Toolkit-Appendix-A.pdf

identified as the most appropriate locations for investment, new homes and job growth under Plan Bay Area 2040. Several opportunity areas also align with communities designated as Disadvantaged under California SB-535, the law that established the Greenhouse Gas Reduction Fund pursuant to the California Global Warming Solutions Act of 2006. These SB 535 neighborhoods (so designated because of both income and air quality criteria) are eligible for additional programs and monies administered by CARB.

Building on the Opportunity Analysis, this study focused on the 16 municipalities identified in Plan Bay Area 2040 as Top Cities for Housing Growth in coming decades. Using these cities as the basis, three carshare growth scenarios estimated the number of carshare vehicles that each city could potentially support under three percent, five percent and ten percent rates of carshare adoption among eligible drivers (Table 1). These adoption rates are based on rounded estimates of the proportion of the driving population that are carshare members in several North American cities.[12]

The scenarios also made the following adjustments to arrive at the population-based adoption rates and associated vehicle counts:

- Current carshare fleet (to subtracting their estimated user base from the potential new users)
- Driving-age population living in medium or high opportunity areas
- Adjustment for the number of people of driving age who have a driver's license around 81% in California, according to FHWA[13]

The three scenarios yielded a potential range of 443 additional carshare vehicles under the lowest growth scenario to almost 1,500 under the highest growth scenario, using a conservative value of 100 new users per vehicle (smaller values mean that fewer members are needed to support a vehicle at a sufficient utilization rate). These scenarios in turn yield an annual range of GHG reductions of 3,990 to 13,300 metric tons of carbon dioxide equivalent (CO2e).

In order to estimate GHG emissions resulting from carsharing, a literature review was conducted. Several studies by Martin, Shaheen, and others indicate that carsharing results in GHG emissions reductions due to several factors:

- Changes in fuel consumption: The average carshare vehicle is newer and more fuel efficient than the average car. Specific data was available from carshare operator Modo

12 At the high end is Vancouver, where at least 135,000 adults out of a metro driving-age population of about 1.5 million are carsharing members, a proportion of about 9%. These members are likely concentrated in the city of Vancouver, with an estimated driver population of around 400,000, making for an even higher municipal-level proportion. Seattle has at least 95,000 carsharing members out of a metropolitan driver population of about 2.3 million, an uptake rate of about 4%. These estimates are based on recent membership counts provided by car2go in August 2017, and as they likely undercount total carsharing members (leaving out those who may be members of other or multiple services) while over counting the likely market by using metro population (while the figures presented in this report are municipal level and concentrate on fairly dense areas), they represent a lower bound of possible adoption rates. The driving population is estimated at 62% of the total population (based on mean proportion of people age 18-75, adjusted for licensure rate estimated by FHWA. Member counts from https://www.car2go.com/media/data/na/press/releases/car2go-na-momentum_release.pdf

13 FHWA, Highway Statistics 2014, Table DL-1C

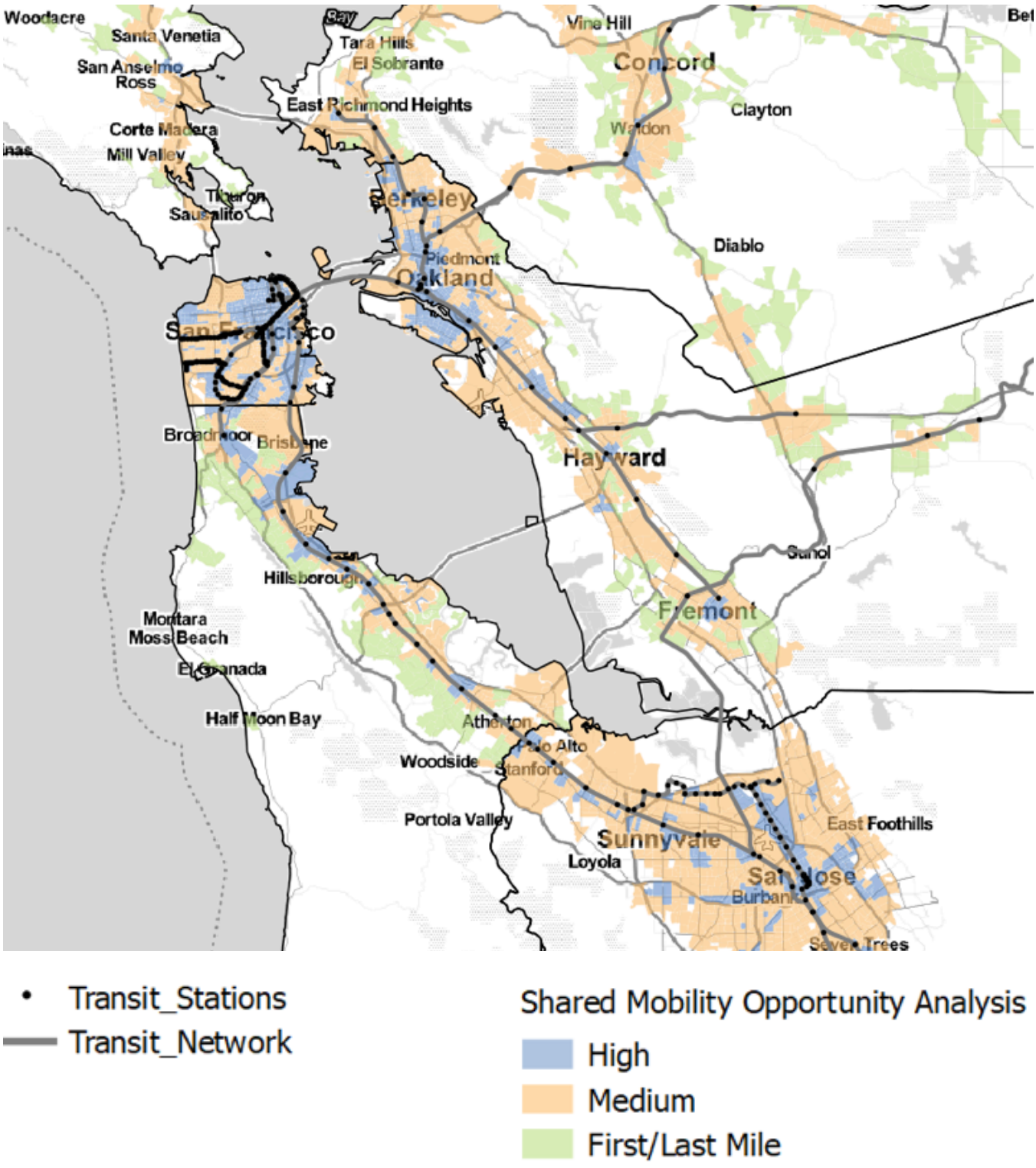


Figure 3: Bay Area Shared Mobility Opportunity Analysis (SUMC)

in Vancouver, whose average fleet is three years old,[14] while the average vehicle in the US is 11.6 years old.[15] In addition, carshare users select cars based on each trip whereas privately owned cars are typically selected based on the most extreme use (for example, a carshare user would select an SUV for a ski trip, but an electric car for a shopping trip, while a car owner would own the SUV to be able to accommodate a ski trip at some point in time).

- Changes in VMT: While some households increase their VMT when they join a carshare, households who either sell a car or forego the purchase of a car as a result typically reduce their VMT and increase bike, walk, and sometimes transit trips. All studies have found some level of VMT reduction.
- Reduction in number of vehicles purchased due to carshare access: This leads to a reduction in GHG emissions caused during the manufacturing process.

In order to estimate GHG emissions reductions, emissions reductions estimates per carshare vehicle were used based on Martin and Shaheen's latest working paper *The Impacts of car2go on Vehicle Ownership, Modal Shift, Vehicle Miles Traveled, and Greenhouse Gas Emissions: An Analysis of Five North American Cities*.[16] The authors found a range of GHG emissions reduc-

			3% Carshare Adoption Rate			5% Carshare Adoption Rate			10% Carshare Adoption Rate		
City	Existing Carshare Vehicles (8/17)	Driving Pop in Med.-High Opp. Areas	New Users	New Vehicles	GHG Emissions Reductions (tons/yr)	New Users	New Vehicles	GHG Emissions Reductions (tons/yr)	New Users	New Vehicles	GHG Emissions Reductions (tons/yr)
Concord	2	30,812	918	9	83	1,531	15	138	3,061	31	276
Dublin	0	9,541	286	3	26	477	5	43	954	10	86
Emeryville	21	7,352	158	2	14	263	3	24	525	5	47
Fremont	4	67,647	2,017	20	182	3,362	34	303	6,725	67	605
Livermore	0	12,263	368	4	33	613	6	55	1,226	12	110
Milpitas	0	32,191	966	10	87	1,610	16	145	3,219	32	290
Mountain View	8	46,680	1,376	14	124	2,294	23	206	4,588	46	413
Oakland	288	229,002	6,006	60	541	10,010	100	901	20,020	200	1,802
Redwood City	4	20,412	600	6	54	1,001	10	90	2,001	20	180
Richmond	0	39,553	1,187	12	107	1,978	20	178	3,955	40	356
San Francisco	1990	540,980	10,259	103	923	17,099	171	1,539	34,198	342	3,078
San Jose	25	435,646	12,994	130	1,169	21,657	217	1,949	43,315	433	3,898
San Mateo	6	41,052	1,214	12	109	2,023	20	182	4,045	40	364
Santa Clara	10	72,612	2,148	21	193	3,581	36	322	7,161	72	645
Santa Rosa	2	44,593	1,332	13	120	2,220	22	200	4,439	44	400
Sunnyvale	4	83,970	2,507	25	226	4,179	42	376	8,357	84	752
Total	2,364	1,714,306	44,337	443	3,990	73,895	739	6,651	147,791	1,478	13,301

Table 1: Carshare growth scenarios and estimated greenhouse gas emissions impacts for the Bay Area's 16 Top Growth Cities

14 Namazu, M., Dowlatabadi H. (2015). Characterizing the GHG emission impacts of carsharing: a case of Vancouver. Environmental Research Letters 10 124017.

15 https://www.rita.dot.gov/bts/sites/rita.dot.gov.bts/files/publications/national_transportation_statistics/html/table_01_26.html_mfd

16 Martin, E.W., & Shaheen, S.A. (2016). The Impacts of Car2go on Vehicle Ownership, Modal Shift, Vehicle Miles Traveled, and Greenhouse Gas Emissions: An Analysis of Five North American Cities. Working Paper. Accessed at http://innovativemobility.org/wp-content/uploads/2016/07/Impactsofcar2go_FiveCities_2016.pdf.

tions of 4 to 14 tons of CO2e per vehicle per year, leading to the average of 9 tons of CO2e used for our estimates. Compared to the impacts shown in other studies, these reductions were the most conservative, relied on the most recent data, and allowed for calculations by carshare vehicle rather than carshare user. Table 1 (see previous page) shows the estimated reduction in tons of CO2e per carshare vehicle per year for the three adoption scenarios discussed above. Additional information on the GHG reduction analysis can be found in Appendix C.

The project team believes that the most likely adoption rate is between three and five percent within the next five to 10 years. The current adoption rate within the city of San Francisco is very close to three percent. Achieving an adoption rate of three percent across the 16 listed cities would require increasing the number of carshare vehicles within those cities by approximately 20%. Achieving the higher adoption rate of five percent would require increasing the number of carshare vehicles by approximately 30%. While not immediately achievable, an adoption rate of five percent could be achieved through the adoption of Options 1 or 2 of recommended Strategy 1. Achievement of a 10% carshare adoption rate is likely dependent on advanced vehicle technologies.

Appendix A: Meeting Notes from Car Sharing Implementation Strategy Workshop

Bay Area Metro (MTC and ABAG)

Climate Initiatives – Car Sharing Implementation Strategy Workshop

September 18, 2017

12:00 to 3:00

General Overview

The workshop was conducted as part of an MTC study to determine how best to expand car sharing to more residents and communities in the Bay Area. The study is part of the organization's on-going efforts to reduce greenhouse gas emissions to meet state mandates. The workshop offered an opportunity for staff from local governments to learn more about car sharing and provide input regarding how car sharing can be more successful in their communities.

Attendees:

- Andrew Smith, City of Walnut Creek
- Andy Thornley, SFMTA
- Carmela Campbell, City of Union City
- Christine Ferry, City of San Mateo
- Christy Wegener, LAVTA
- Chelsea Marcell, City of Fremont
- Chris Weeks, Bishop Ranch Transportation Center
- Corinne Dutra-Roberts, 511 Contra Costa
- Dana Turrey, SCTA
- Danielle Dai, City of Oakland
- Dermot Hikisch, Gig Car Share
- Franco Arieta, Zipcar
- James Paxson, Hacienda Business Park
- Jean-Michel Boujon, Getaround
- Jessica Garner, City of Milpitas
- Jessica Gonzalez, City of Concord
- Justin Lovell, City of South San Francisco
- Linda White, ReachNow
- Mary Thomas, City of Hayward
- Michael Cass, City of Concord
- Michael Fossati, City of Milpitas
- Michael Jacobson, SFMTA
- Nina Rizzo, TransForm
- Ozzy Arce, City of Walnut Creek
- Patty Boonlue, VTA
- Peter Dempster, ReachNow
- Rachel DiFranco, City of Fremont
- Ria Hutabarat Lo, City of Sunnyvale
- Robert Franklin, BART
- Sofia Mangalam, City of Newark
- Steve Chan, City of Milpitas
- Terrence Grindall, City of Newark
- Tracy Minicucci, SFMTA
- Tristan Hensel, Maven
- Walter Rosenkranz, Car2Go
- Project Team:
    - o Krute Singa, Bay Area Metro (MTC/ABAG)
    - o Matthew Kaufman, UrbanTrans

- Sharon Feigon, Shared-Use Mobility Center
- Tim Frisbie, Shared-Use Mobility Center

Agenda Item: Welcome

Presenter: Mary Thomas, City of Hayward

Mary Thomas provided a general welcome to attendees.

Agenda Item: Workshop Overview

Presenter: Krute Singa, Bay Area Metro

Krute Singa thanked attendees for their participation, provided a brief overview of the MTC car sharing implementation strategy study and gave a quick overview of the workshop agenda.

Car sharing is part of MTC's Climate Initiatives Program that invests in strategies contributing to achieving the region's GHG emissions reduction target by reducing transportation-related emissions and vehicle miles traveled and encouraging the use of cleaner fuels. The climate initiatives strategies are identified in Plan Bay Area, and the strategies, including car sharing, help the region meet state GHG reduction targets: reduction of 10% in 2020 and 15% by 2035. The car share program will help to achieve the 2020 targets.

The objective for the car sharing strategy is to reduce car ownership through the provision of car sharing services and thereby reduce the region's per capita GHG emissions reductions. The way this project is defining car sharing is as a service that allows individuals to rent vehicles for short trips, providing access to a car without the costs of individual ownership. Car sharing is evolving and growing in the Bay Area through traditional roundtrip, one-way and peer-to-peer models.

Even though these services have advanced, competition from ride-hailing companies has impacted membership rates. Furthermore, service expansion into less dense, low to middle-income neighborhoods and non-English speaking communities has met challenges. The objective of the workshop is to better understand the challenges and obtain private and public-sector perspectives and experience to guide this planning effort and implement an effective program that helps the region meet the 2020 GHG reduction targets.

Agenda Item: State of Car Sharing in the Bay Area

Presenter: Tim Frisbie, Shared-Use Mobility Center

Tim Frisbie presented information on the state of car sharing nationally and in the Bay Area. He said that the number of shared mobility companies is growing in North America and discussed the various forms in which car sharing is offered. They include traditional car sharing, represented by companies like Zipcar, Enterprise CarShare and Maven; one-way car sharing, also called point-to-point and free floating, represented by companies like car2go, ReachNow, and Gig; peer-to-peer car sharing in which companies like Getaround and Turo facilitate car sharing between private individuals; and electric car sharing offered by ReachNow, Maven, BlueLA and others.

A number of studies have found that the average car share vehicle takes 9 to 13 privately

owned cars off the road. A 2016 study by Martin and Shaheen of car2go members in five cities found that membership affects travel behavior. Members use transit less frequently, walk more frequently, use taxis less and reduce their overall vehicle miles of travel. For the vast majority of members, car2go membership did not result in a vehicle sale or a postponed vehicle purchase, but it did yield a net vehicle reduction, perhaps due to vehicle suppression.

Car sharing is beginning to converge with ride sourcing and car rental products. ReachNow is testing a monthly-fee model that provides members with one-way car sharing, chauffeured TNC rides and weekend rentals. Maven is offering weekly rentals to TNC drivers. At the same time, significant funding is flowing into car sharing, TNCs and autonomous vehicles. Major investors include Toyota, Volvo, Tata Motors, Microsoft, Google, Ford, GM, Daimler, BMW, Intel and Volkswagen.

Car sharing in the Bay Area started in 2001 when City CarShare launched. Since then, the region has seen six additional providers offer service, two exit the market and two mergers. Major providers include Zipcar (980 vehicles), Getaround (1,470 vehicles), Maven (60 vehicles) and Gig (250 vehicles). Car share vehicles are clustered in San Francisco, Berkeley, Oakland and Palo Alto. A map of opportunity areas for car sharing showed that car sharing could be successfully expanded to many areas outside of the current clusters.

Numerous policies exist to support car sharing and include free-floating car-share permits that allow vehicles to park at any legal paid parking space within a city; the designation of on-street parking spaces for car share vehicles; transportation demand management ordinances to encourage travel by alternative modes and support for car share vehicles; integration of car sharing with transit via co-location at transit stops, payment integration and cross marketing and promotions; integrating car share at large developments; city use of car share vehicles as fleet vehicles; and land use and transportation planning that supports multiple travel modes.

Agenda Item: Car Sharing in Oakland

Presenter: Danielle Dai, City of Oakland

Danielle Dai presented information on car sharing in the city of Oakland, where 17% of households have no cars; within downtown 57% of renters and 25% of owners live car free. Oakland's interest in car sharing comes from its goals to reduce GHG emissions by 36% and VMT by 20% as compared to 2005 levels by 2020. The city also sees car sharing as a way to lower transportation costs; improve access to jobs, education, training and needed services; and increase transportation options while minimizing parking demand, congestion and pollution.

Due to its benefits, the city feels it should encourage car sharing by leveraging its parking assets, but it wants to assure that the city is fairly compensated for the assets and that services are equitably distributed throughout the city. The city received a $320,000 award from MTC to help it expand car sharing.

Oakland has made on-street parking spaces available to car share providers. Any provider can apply for an available space and subsequently have exclusive use of the space. Vehicles parked in the space are exempt from

time limit, residential parking permit (RPP) and street sweeping regulations. Permits are priced based on demand.

Oakland also offers a Free-Floating Zone Parking Permit (FFZPP), which waves parking duration time limits of two hours or more. The cost of the permit is $1,278 per vehicle. Also available is a Master Residential Parking Permit that allows vehicles to park in RPP zones. To qualify for the permits, 20% of vehicles must be available in MTC-designated community of concern census tracts. Gig was the first provider to launch one-way car sharing in the city and did so on April 30, 2017. It was the nation's first multi-jurisdictional service.

Moving forward the city will closely monitor the availability of car sharing in disadvantaged neighborhoods and work to assure that changes to the transportation system do not worsen inequality.

Agenda Item: Car Sharing in San Mateo

Presenter: Christine Ferry, City of San Mateo

Christine Ferry presented information on the city of San Mateo's experience with car sharing. The city received a grant from MTC to assist it with bringing a car share program to the city. As part of that effort, the city went out to bid for a car share provider. Zipcar was the only provider to respond to the request for proposals. The city did not enter into a formal contract with Zipcar for service but allowed the company to provide service within the community. However, the city does have a contractual agreement through which it provides a couple parking spots. In addition, the city has helped facilitate conversations through which Zipcar was able to secure other parking locations.

The city now has eight active locations where car share vehicles are available, and those vehicles are used an average of 4,000 hours per quarter. Weekday use is similar to weekend use.

The city originally wanted electric vehicles but did not get them. This was partly related to issues associated with using federal dollars for the car share program.

Some of the partners that participated in the city's grant and expressed a desire to host a car share vehicle did not ultimately do so. This was due to an inability on the part of the partners to secure an agreement with Zipcar. While reasons for not securing agreements varied, the primary issue was likely liability.

The city helps market the car share program through a one-stop website that provides visitors with information on all local transportation options. The city also coordinated a 10-month marketing campaign in coordination with commute.org.

Agenda Item: Questions for All Previous Presenters

Upon conclusion of the three presentations, attendees were offered an opportunity to ask the presenters questions.

Discussion

- Danielle Dai was asked where the city of Oakland obtained the data it provided regarding household characteristics. The city obtained the data from the California Household Travel Survey and the Census's

American Community Survey.

- Danielle Dai was also asked if the city knew what percentage of its carless households were carless by choice. She said she did not but noted that the city is planning to conduct a survey of community members that includes people who participate in the car share program and those who do not. Questions about car ownership and travel choices will be asked in that survey.
- Christine Ferry was asked why the city of San Mateo went out to bid for a car share provider. She said it was because the city originally wanted electric vehicle (EV) and the city was planning to assign parking spaces between vendors. Neither of these items occurred.
- A participant asked if car share payment can be integrated with the Clipper Card. Krute Singa said the MTC has a new request for proposals for what is being called Clipper 2.0. The updated card will include payment for more types of transportation services including car share, bike share and other multi-modal options.
- Christine Ferry was asked which grant partners did not add car share vehicles and why. She said the partners were a community college and shopping center. They likely did not add car share vehicles because of indemnity clauses, but Ms. Ferry was not certain of that.
- Christine Ferry was asked if San Mateo actively tried to get other car share providers to bid. She said the city send the RFP to all existing car share operators, but only Zipcar responded. An attendee from Fremont said Zipcar was the only respondent to that city's RFP.

Agenda Item: Panel Discussion

Facilitator: Sharon Feigon, Shared-Use Mobility Center

Panelists:

- Walter Rosenkranz, car2go
- Dermot Hikisch, Gig Car Share
- Franco Arieta, Zipcar
- Peter Dempster, ReachNow
- Jean-Michel Boujon, Getaround
- Tristan Hensel, Maven

Discussion

The panelists were asked to respond to multiple questions, which have been listed below along with a summary of the responses received.

Question: What has been the biggest obstacle to your organization's growth?

Discussion: Parking was cited by multiple providers as an obstacle to program expansion. Walter Rosenkranz said that free floating systems like car2go are dependent on the availability of parking spaces; they go into a market in mass and need to have access to many parking spaces that are accessible to members. The parking issue is made worse because car sharing programs are typically in the densest parts of cities. Jean-Michel Boujon said that parking is an issue for Get Around, but less so because in the peer-to-peer model owners typically have parking for their vehicles.

Many providers cited bureaucracy as a barrier to expansion. RFP and qualification processes require significant resources. These barriers could be lessened if cities streamlined their RFP

and/or qualification processes or worked together to have a single regional process. Dermot Hikisch noted that Berkeley adopted one-way car sharing policies that were very similar to Oakland's, which made it easy to expand services from Berkeley to Oakland. Peter Dempster said that the success of ReachNow was limited by the inability of cars to float freely among parking zones and meters in dense areas like San Francisco, Berkeley and Oakland. He said that in Seattle, where the regulatory environment was more supportive, ReachNow was able to achieve within a few weeks the membership levels it took a couple years to achieve in the Bay Area. Walter Rosenkranz encouraged cities to think about equity and policy goals in relation to the regulations and costs that are placed on car share operators versus TNCs. While car share operators are often charged to park in the public right of way, TNCs are generally able to operate without fees.

Awareness was another issue cited by the providers. Jean-Michel Boujon said that with peer-to-peer systems, encouraging owners to share on the platform can be difficult because of the large number of questions people have and concerns about liability. These issues are lessened in markets where people are familiar with the peer-to-peer concept. Tristan Hensel said that Maven can only scale as quickly as it can raise awareness of its brand.

Walter Rosenkranz, Dermot Hikisch, and Peter Dempsey all cited a lack of density as a barrier to car sharing. Walter Rosenkranz said that for car2go to provide service in less dense areas they would likely need very favorable parking policies and some grants to offset costs.

Question: What support do car share operators need to scale up?

Discussion: Recommendations for scaling operations focused primarily on subsidies, marketing assistance and land use policies. Peter Dempster said that cities can provide financial assistance by paying for memberships, minutes and infrastructure costs. Tristan Hensel said that cities can also provide financial support by replacing their own fleets with car share vehicles or providing direct subsidies for certain vehicles.

With respect to marketing assistance, Peter Dempster suggested that cities create mobility as a service options and educate residents about their mobility options. Franco Arieta said that promotion of car share on travel websites is helpful as are efforts that target mixed-use developments to encourage residents and businesses to participate in car sharing. Tristan Hensel said that marketing assistance should be more than just website posts and include bus stop ads and other high-visibility options. Walter Rosenkranz said cities can help by facilitating conversations between car share operators and developers and property owners.

Land use policies were cited as an area where cities can support car sharing. Dermot Hikisch said cities need to continue to focus on density and the creation of commercial corridors while reducing the number of parking spaces associated with new development. Jean-Michel Boujon said cities need to make more policy decisions and infrastructure and service investments that support non-auto travel modes.

Question: What can cities do now to support car sharing that does not require a policy change?

Discussion: The panelists quickly identified a number of items including joint marketing efforts, assistance with partnership development, funding, assistance with infrastructure investments, creation of travel tools that allow people to understand their travel options, and dedicated parking spots for car share vehicles at transit stations.

General Questions: Attendees were invited to ask the panel questions, which are summarized below.

Question: Sunnyvale has residential and commercial land uses separated. How can companies rebalance in that kind of an environment?

Answer: Gig has staff who are assigned to reallocate vehicles if they cluster. Car2go's fleet generally balances itself, but they also have an algorithm that helps them know when they need to move vehicles. Franco Arieta said it would be difficult to operate in an area where the fleet is likely to be out of balance. It was noted that some operators have offered free rides to get members to move vehicles. Reach Now geotargets people with special promotions in lower density areas to try to balance its fleet through members.

Question: Have any car share operators ever thought about forcing people to share vehicles when they have lots of demand for trips going from one area to another?

Answer: Reach Now has invested in Scoop and is trying to figure out how to combine car sharing with carpooling.

Agenda Item: Breakouts

Attendees were assigned to one of three breakout groups that included representatives from the public and private sectors. The breakouts were facilitated by members of the MTC project team, and a set list of questions was provided to guide the discussions. No group answered all of the questions nor did all groups answer the same questions. A summary of each group's discussion is provided below.

Group 1

Question: What kind of support do you need from the region, state or other public entities?

Discussion: Participants suggested multiple items that could help them expand or bring car sharing to their communities. Suggestions included having counties conduct RFP processes for car sharing that cities could opt into, MTC or counties creating a model ordinance that cities could opt into, and technical support from counties or MTC to cities seeking to bring car sharing to their communities or expand existing car sharing services. The car share providers in the group noted that a model ordinance or single RFP process could help them expand their services. Equivalent regulations would allow car share providers to move vehicles between jurisdictions while a single RFP process would significantly reduce the amount of staff time providers must spend to enter a market. Other suggestions included government support for marketing efforts, integration of information

about car share services into commute program offerings, and funding for staff to work directly with community members to educate them about car sharing and encourage them to use car share services. While city representatives expressed an interest in funding for staff positions, they also noted that hiring is difficult, and a more preferred option would be for MTC to provide staff who could assist with outreach. They also noted that it would be more efficient from their standpoint if MTC provided grants directly to private companies rather than requiring cities to manage the grants.

Question: What challenges do you see for car sharing? What are the biggest?

Discussion: One of the car share providers noted that going into a market too soon and then having to pull out of the market, as has happened in the Bay Area, hurts trust. Expansion needs to be paced to avoid this situation. It was also noted that many communities would like electric vehicles(EVs), but EVs may cost more to operate. To keep costs down for the end user, subsidies are likely necessary if an EV fleet is desired. Finally, participants said that car sharing vehicles need to be secure, which is not always the case with on-street parking. There can be a fine line between visibility and security.

Question: What would it take for car sharing to succeed/scale in your community?

Discussion: Suggestions for expanding car sharing included cities providing parking spaces and infrastructure, cities using car share vehicles for their fleets (and making them available to residents on nights and weekends) and cities creating development regulations that would encourage car sharing. It was also suggested that cities should be willing to have conversations with providers before going out to bid for services, be flexible in terms of requirements and expectations, and should work with providers to increase adoption rates by identifying and implementing innovative subsidies and other strategies.

Group 2

Question: What has your (city) experience been with car sharing to date?

Discussion: City representatives reported support and challenges to car sharing within their communities. Some said that they have received pushback regarding parking for car share vehicles and that their communities are very auto-centric and not always supportive of other travel modes. Other cities said they are going to require car sharing at TODs and hotels.

Question: What challenges do you see for car sharing? What are the biggest?

Discussion: The group cited multiple challenges affecting the potential success of car sharing in their communities. Items included a lack of awareness regarding what car sharing is, low densities, minimal transit service, poor walkability and poor connectivity. They also said diverse demographics can be challenging; larger families have a need for vehicles with more seats and families with small children need child/booster seats. Other issues included fleet availability, a mix of providers and markets, and jurisdictional issues that make operations more difficult for car share providers. Potential solutions identified by the group included programs to educate citizens about car sharing and

payment integration for car sharing with the Clipper 2.0 card.

Question: What opportunities do you see for car sharing? What are the biggest?

Discussion: New development and associated development agreements create an opportunity to expand car sharing as do increases in transit service (BART and Caltrain).

Question: What are your biggest transportation needs? Could car sharing be a fit?

Discussion: Transportation issues affecting participating communities included a lack of housing, long commutes, parking shortages, a lack of travel options beyond driving personal vehicles and unsafe walking conditions.

Question: What would it take for car sharing to succeed/scale in your community?

Discussion: Participants cited a number of items that would help car sharing succeed in their communities. Items included community education, clear pricing information and greater transparency. From an assistance standpoint, they would like to see model ordinances, examples of success from cities other than San Francisco and the ability to test car sharing through short pilots that are scalable based on success. It was suggested that education about car sharing could occur through webinars, presentations to city councils and coordination with TMAs.

Group 3

Question: What opportunities do you see for car sharing? What are the biggest?

Discussion: The group identified numerous opportunities car sharing and transportation issues that it could help address. They included:

- Car sharing as a tool to help address first and last mile issues.
  - Changes in auto ownership that are resulting in fewer cars per household creates an opportunity for more car sharing.
  - The cost of car ownership is not understood, and better education regarding costs could increase demand for car sharing.
  - Car sharing could be placed in affordable housing to expand the mobility of residents.
  - When people are having a car repaired it is a good opportunity to educate them about car sharing.
  - Car sharing can be used to address the transportation needs of families with young adults when not everyone in the household has a vehicle.

Question: What challenges do you see for car sharing? What are the biggest?

Discussion: Challenges identified by the group included community resistance to providing for-profit companies with money or access to the public right-of-way and distrust of services that are linked to tech funding.

Question: What would it take for car sharing to succeed/scale in your community?

Discussion: Multiple opportunities were identified to make car sharing more successful. Options included creating more pods in neighborhoods that could be placed at churches, schools and developments that received government incentives; more funding for car

share providers; lower permit costs for providers serving less dense areas; greater adoption of legislation that encourages or mandates unbundled parking; and requirements that car sharing be incorporated into development agreements (subsequently allow developers to reduce their parking). There was also significant discussion regarding education. Participants cited a need for education regarding the different forms of car sharing, high-profile demonstration projects and opportunities for user to share their experiences with non-users.

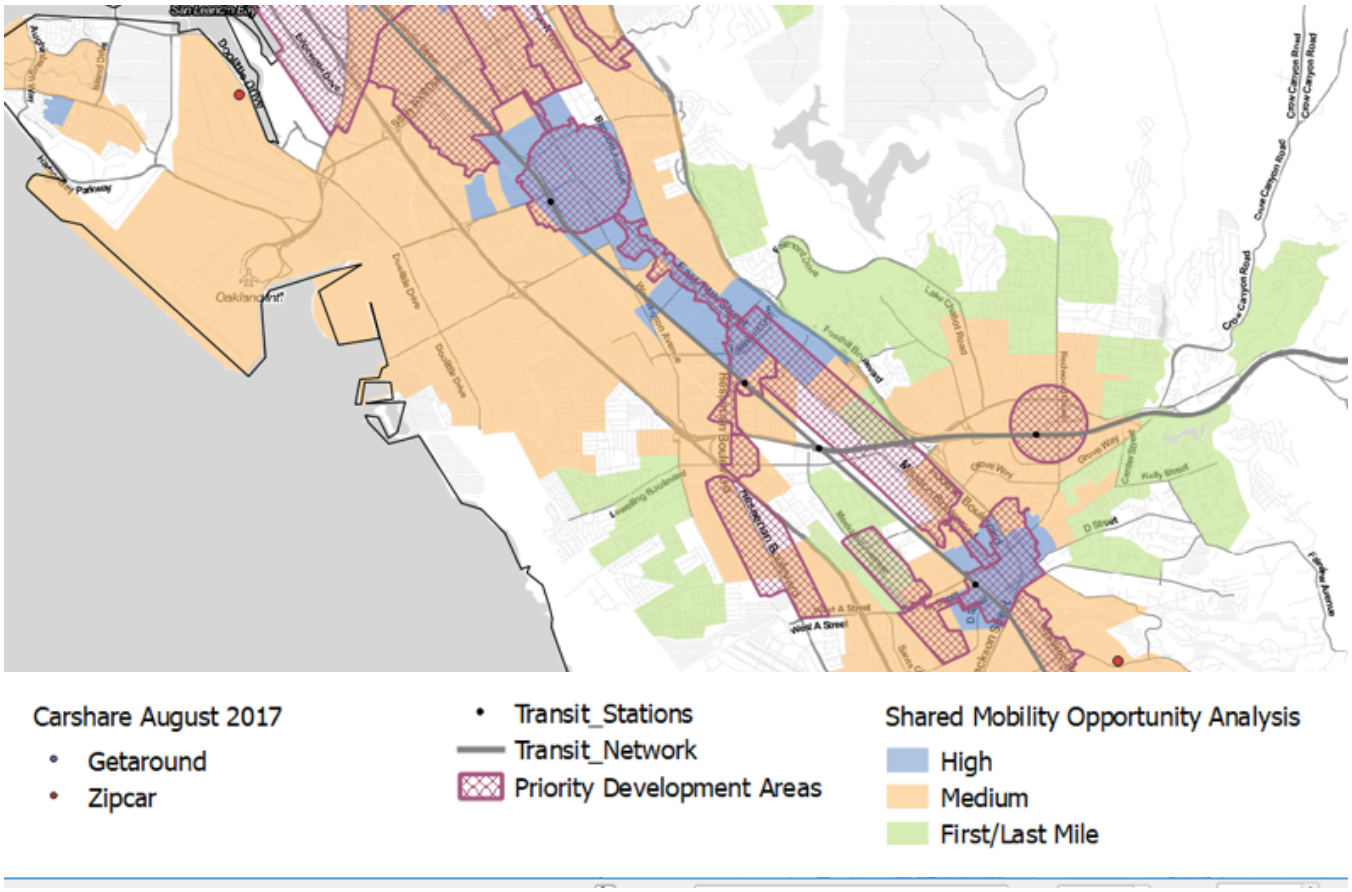
Question: What is the perception and level of awareness of car sharing among local residents?

Discussion: Some people perceive that one-way car sharing vehicles do not move and instead take up parking spaces, some people think that car share vehicles are dirty, individuals living in suburban areas tend to be less aware of car sharing and car share pods are sometimes perceived as "dumping grounds."

Appendix B: Opportunity Place Types

The materials within this appendix identify several different carshare potential markets. These markets in many cases are representative of areas that can be found in communities across the Bay Area.

San Leandro & Hayward Corridor



Population
San Leandro: 89,039[17] [6,671/Sq. Mile]
Hayward: 154,507[18] [3,393/Sq. Mile]

Average Autos/Household[19]
San Leandro: 1.9
Hayward: 2

Average Household Size[20]
San Leandro: 2.8
Hayward: 3.2

Carshare Vehicles, August 2017
San Leandro: 0
Hayward: ~5

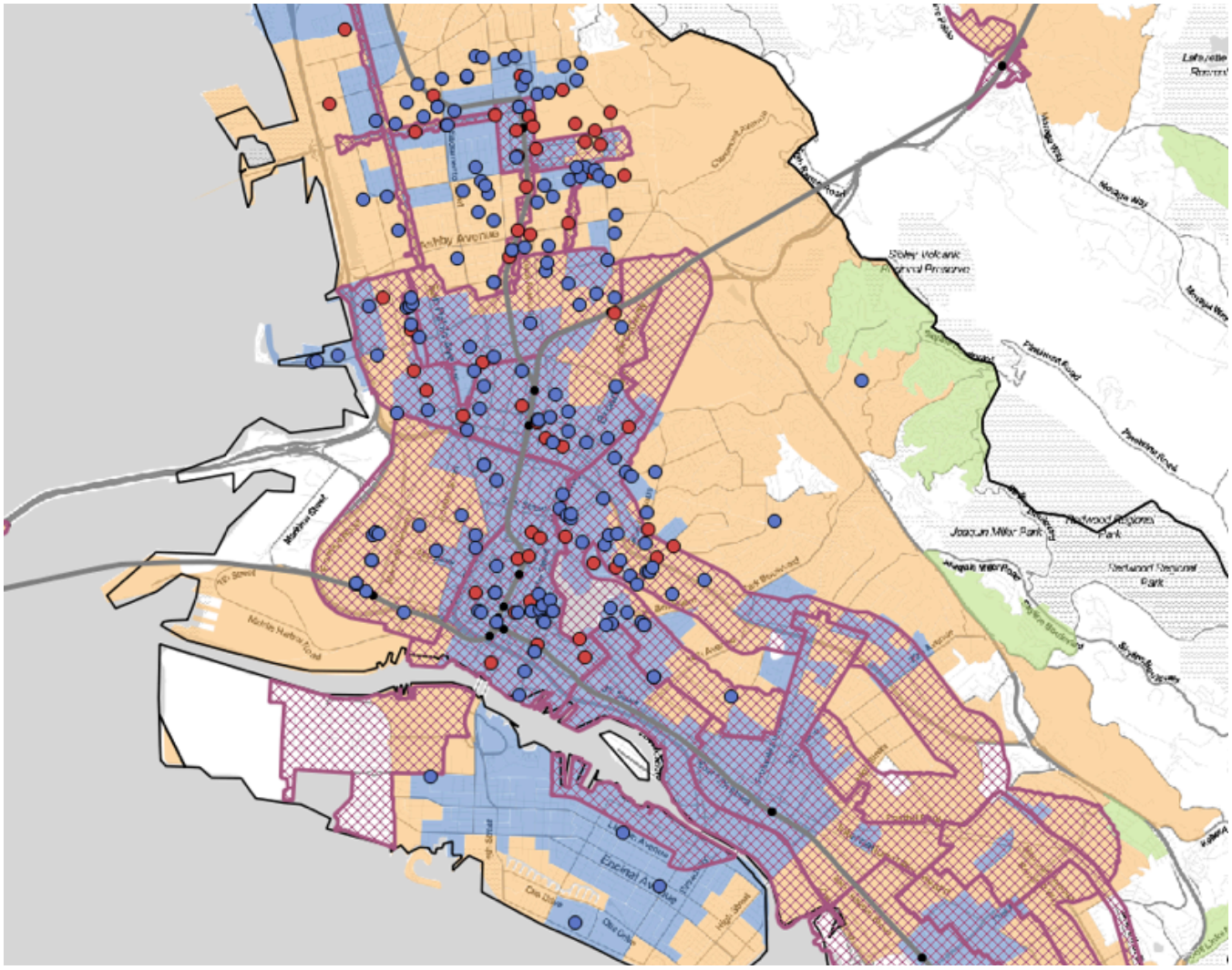
Opportunity

The San Leandro & Hayward corridor runs along State Route 185 and is also served by BART. Hayward received funding under the MTC carshare initiative and its E-76 report has been approved. The corridor was found to have conditions that support carshare, particularly at or near the BART stations. Two-way carshare (both private & P2P) should be considered first and will have the greatest opportunity to succeed if coupled with supportive policies, funding, marketing, and with the TOD Corridor improvements presented in the Caltrans State Route 185 Transportation Concept Report.

The corridor also has several Priority Development Areas and areas that qualify as SB 535 Disadvantaged Communities.

17 Population recorded from Table DP05, 5-Year 2016 ACS
18 Land area recorded from 2016 *Gazateer* California summary
19 Total households S1101over total vehicles in Table B25046, 5-Year 2016 ACS
20 Average household size recorded from Table S1101, 5-Year 2016 ACS

Alameda & Emeryville Population



Alameda: 77,409 [7,413/Sq. Mile]
Emeryville: 11,111 [8,674/Sq. Mile]

Average Autos/Household
Alameda: 1.6
Emeryville: 1.2

Average Household Size
Alameda: 2.5
Emeryville: 1.8

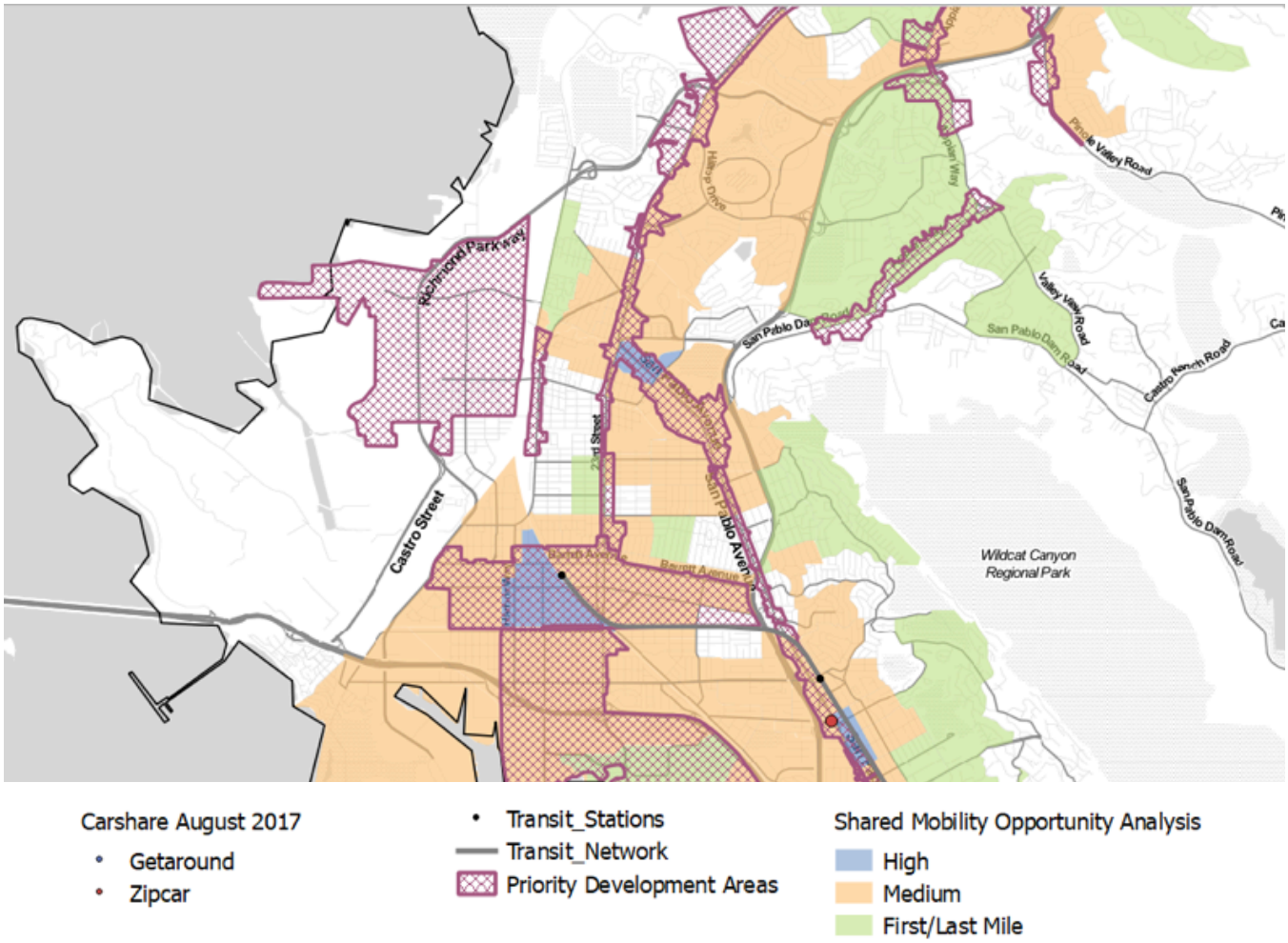
Carshare Vehicles, August 2017
Alameda: ~4
Emeryville: ~21

Opportunity

With the arrival of Gig carshare, a free-floating service, Oakland and Berkeley have experienced tremendous growth in carshare access, largely through a revaluation of local carshare ordinances and implementing policies to enable free floating carshare across municipal borders. As neighbors to the current Gig service area, Emeryville and Alameda could extend the area accessible by free-floating service, provided they enter a similar cross-jurisdictional agreement.

Zipcar also operates cars in both cities, along with the availability of vehicles through Getaround. There is the potential to support additional carshare cars on site especially as these cities continue to grow.

Richmond



Population: 108,303 [3,604/Sq. Mile]
Average Autos/Household: 1.7
Average Household Size: 2.9
Carshare Vehicles, Aug. 2017: 0

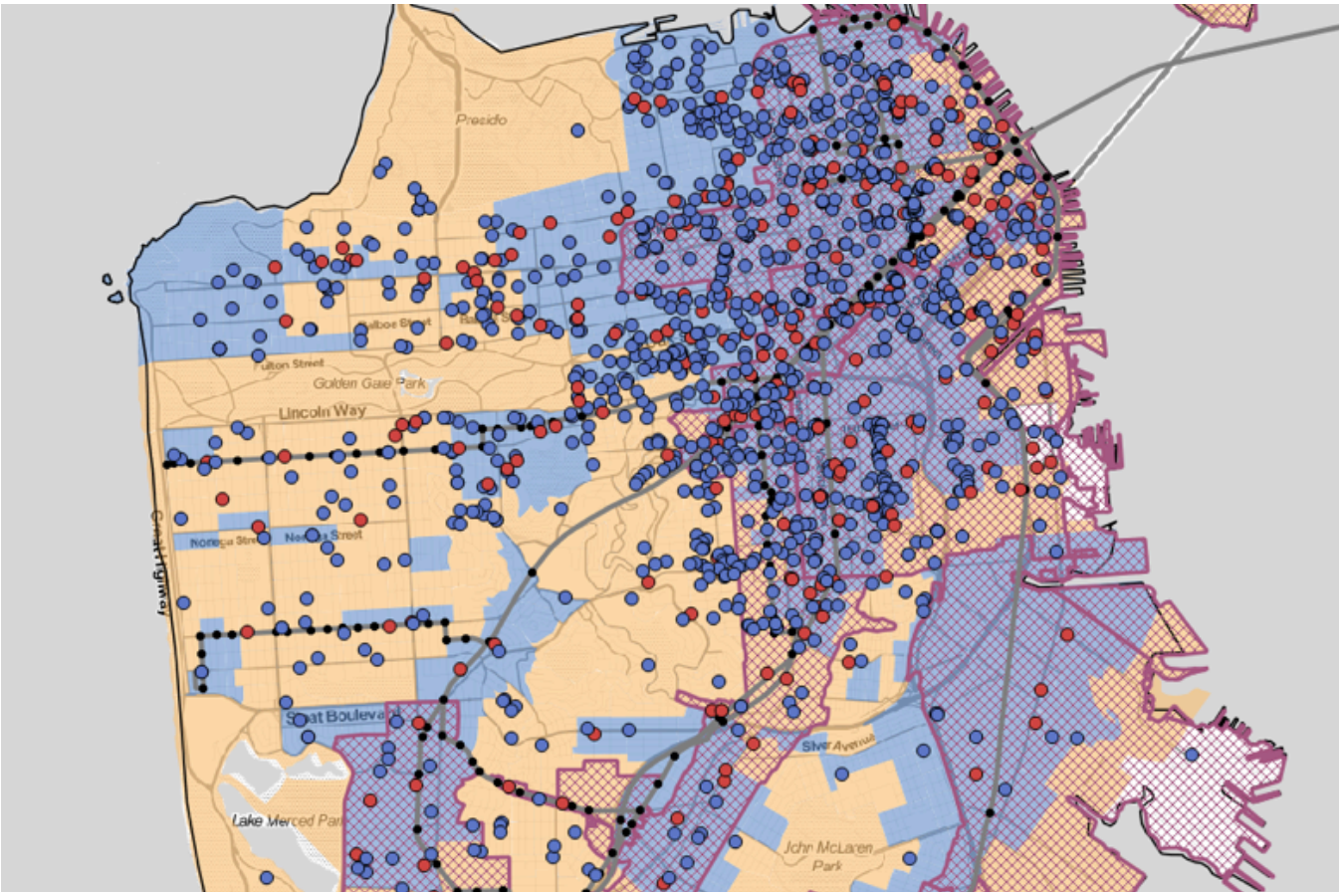
Opportunity

The highest scoring carshare opportunity in Richmond is located in the "Iron Triangle" district adjacent to the Richmond BART station, an area that includes the downtown business district. The opportunity also aligns with a designated Priority Development Area.

The relatively high concentration of jobs and housing coupled with BART transit access offer an opportunity to make this area a carshare hub. A carshare program could start with a small number of two-way carshare cars and potentially build outward to capture residential neighborhoods.

Given the suburban nature of this community carshare would have the greatest opportunity for success when coupled with supportive carshare policies and marketing outreach from the city.

San Francisco

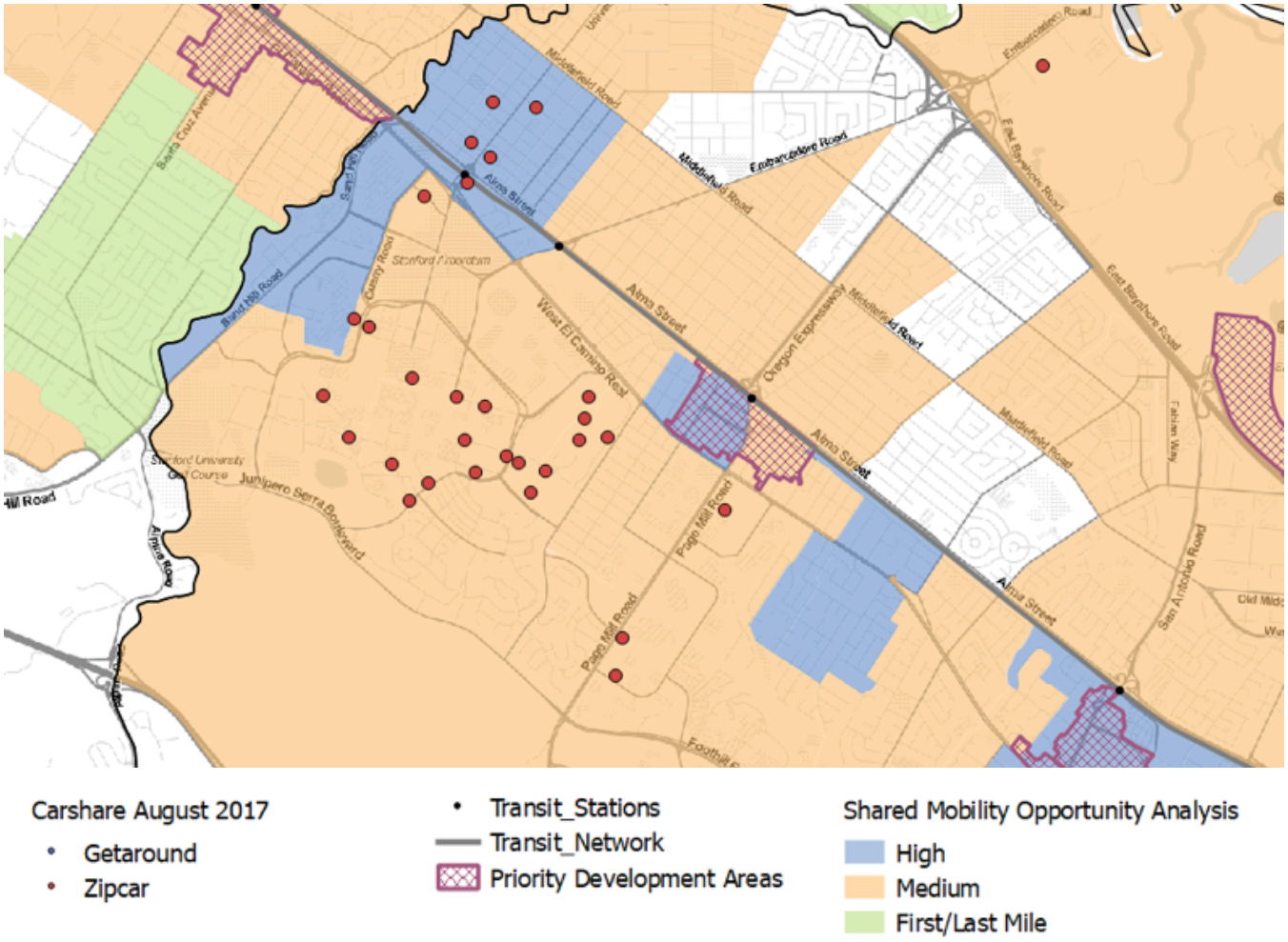


Population: 850,282 [18,132/Sq. Mile]
Average Auto Ownership: 1.1
Average Household Size: 2.3
Carshare Cars Aug. 2017: ~2,000

Opportunity

San Francisco has the greatest concentration of carshare in the Bay Area and SUMC analysis indicates that there is still opportunity to expand these services. The Census block groups in blue are the highest scoring opportunities so additional parking and other supportive policies should be considered to further strengthen this market.

Palo Alto



Population: 66,649 [2,793/Sq. Mile]
Average Auto Ownership: 1.8
Average Household Size: 2.5
Carshare Cars Aug. 2017: ~13

Opportunity

Zipcar currently services Palo Alto with concentrations downtown and at the Stanford campus.

The highest carshare areas are shown in blue and there is some overlap between those areas and the Priority Development Areas. The orange areas on the map were identified as also holding opportunity to support carshare although at a lower density. These areas should be further evaluated to identify strategic carshare locations that could be coupled with large businesses or housing developments.

In light of the recent funding that Palo Alto added of $480,000 to its TDM program, carshare could be explored as a tool to help strengthen first/last mile connections to the many corporate and educational campuses in the area, as well as for “errand cars” at those locations.

Appendix C: GHG Calculations Reference

Relevant Research Reviewed

- Cervero, R., Golub, A., & Nee, B. (2007). City CarShare: Longer-term travel demand and car ownership impacts. Transportation Research Record 1992, 70-80.
- Chen, T. D., & Kockelman, K. M. (2016). Carsharing's life-cycle impacts on energy use and greenhouse gas emissions. Transportation Research 20 Part D: Transport and Environment, 47: 276-284.
- Dill J., McNeil N., & Howland, S. (2017). Peer-to-peer carsharing: Short-term effects on travel behavior in Portland, OR. Final report for Value Pricing Pilot Program, FHWA, U.S. DOT.
- EPA Greenhouse Gas Equivalencies Calculator - Calculations and References, accessed at https://www.epa.gov/energy/greenhouse-gases-equivalencies-calculator-calculations-and-references
- Martin, E.W., & Shaheen, S.A. (2011a). Greenhouse gas emission impacts of carsharing in North America. IEEE Transactions on Intelligent Transportation Systems 12(4), 1074-1086.
- Martin, E.W., & Shaheen, S.A. (2016). The Impacts of Car2go on Vehicle Ownership, Modal Shift, Vehicle Miles Traveled, and Greenhouse Gas Emissions: An Analysis of Five North American Cities. Working Paper
- Namazu, M., Dowlatabadi H. (2015). Characterizing the GHG emission impacts of carsharing: a case of Vancouver. Environmental Research Letters 10 124017.

Sources of Greenhouse Gas Emissions Savings

- Changes in VMT
  - o Decrease in VMT (due to sold car, car purchase avoided, & increase in bike & walk trips, as well as increase in trip chaining due to limited car availability)
  - o Some increase in VMT (induced trips from members who did not previously have access to a car)
- Changes in fuel efficiency
  - o Use of right-sized car
  - o Carshare fleet vehicles are newer and more efficient than average car (average age of privately owned vehicle was 11.6 in 2016 with an average fuel consumption of 22 mpg. Average age of carshare vehicle estimated at 3 years with typically better fuel efficiency due to improvements in fuel efficiency and a fleet mix that is more fuel efficient than the average private vehicle)
- Reduction in number of vehicles purchased due to carshare access

  Decrease in greenhouse gas emissions caused by manufacturing of vehicles

Observed Reductions in Vmt and Ghg Emissions In Studies

- GHG emissions reductions per carshare vehicle ranging from 4 tons to 14 tons per year (Martin & Shaheen, 2016)

- Reductions of GHG emissions per year per household range from .58 to .84 metric tons (Martin & Shaheen, 2010)
- Life-cycle analysis indicates a reduction in GHG emissions of 31.1% to 67.3%. The reductions can be attributed to mode shifts and avoided travel, savings in parking infrastructure demand and reduced fuel consumption (Chen & Kockelman, 2016).

Basis for GHG Emissions Impact Calculations for this Report

In order to estimate GHG emissions reductions, emissions reductions estimates per carshare vehicle were used based on Martin and Shaheen's latest working paper *The Impacts of Car2go on Vehicle Ownership, Modal Shift, Vehicle Miles Traveled, and Greenhouse Gas Emissions: An Analysis of Five North American Cities*.[21] The authors found a range of GHG emissions reductions of 4 to 14 tons of CO2e per vehicle per year, leading to the average of 9 tons of CO2e per car share vehicle per year. Compared to the impacts shown in other studies, these reductions were the most conservative, relied on the most recent data and allowed for calculations by carshare vehicle rather than carshare user, which also reflects a more conservative approach.

21 Martin, E.W., & Shaheen, S.A. (2016). The Impacts of Car2go on Vehicle Ownership, Modal Shift, Vehicle Miles Traveled, and Greenhouse Gas Emissions: An Analysis of Five North American Cities. Working Paper. Accessed at http://innovativemobility.org/wp-content/uploads/2016/07/Impactsofcar2go_FiveCities_2016.pdf.