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Residential On-Site Carsharing and Off-Street Parking Policy in the San Francisco Bay Area, Research Report 11-28

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Residential On-Site Carsharing and Off-Street Parking Policy in the San Francisco Bay Area



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REPORT 11-28

RESIDENTIAL ON-SITE CARSHARING AND OFF-STREET PARKING POLICY IN THE SAN FRANCISCO BAY AREA

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EXECUTIVE SUMMARY

This research explores the practice of providing on-site carsharing within residential buildings and carsharing's relationship with off-street parking policy in the San Francisco Bay Area. On-site carsharing has the potential to reduce the demand for private car ownership and usage, and hence, the parking required to serve residents. On-site carsharing is a recent development; however, it has increasingly been embraced by key stakeholder groups, including developers, service providers, residents, and policymakers. Given recent growth in the carsharing market and the simultaneous tightening of parking supply in many cities, on-site carsharing may play a growing role in the future.

This research investigates the current practice of on-site carsharing and the associated parking standard changes from the perspective of three key groups: building developers, carsharing service providers, and local policymakers. Survey data collected from these groups in San Francisco suggest that in the past ten years, carsharing has begun to play a very important role in the city, substantially altering both travel demand and policies regarding off-street parking for multifamily homes. While San Francisco has successfully marketed carsharing to a significant sector of the population, most suburban communities in the Bay Area have only begun to consider carsharing, and many are still hesitant to introduce it, even in transit corridors. Developers and residents must be convinced of its merits before it will be widely accepted.

Respondents provided a wealth of information regarding the advantages of providing carsharing, and they also offered several recommendations for improving the on-site carsharing experience for all stakeholders. Developers highlighted the need to improve communications with city regulators requiring carsharing early in the planning process, as some developers are still in the dark with respect to what is expected of them and why. Similarly, carsharing providers identified the need for city regulators to release developer information on an ongoing basis, so that providers can effectively market their service to developers and, hence, to potential new customers.

Based on 15 carsharing stakeholder interviews, we identified some major factors contributing to the relative success or failure of on-site carsharing programs, including bundled versus unbundled off-street parking in the development, linkages to off-street parking standards, financial constraints, the extent of transit service, and the degree of coordination among stakeholders. In general, on-site carsharing has been well accepted by developers, planners, and service providers as a way of reducing parking demand and expanding local carsharing markets. However, there is a need for better integration of on-site carsharing programs and off-street parking standards and for better integration of the on-site carsharing programs with carsharing business operations. Sometimes, the reduction in parking demand resulting from on-site carsharing does not lead to a reduction in parking provision. In addition, service providers may not be aware of on-site carsharing developments and therefore may miss out on important business opportunities. An effective on-site carsharing program should coordinate the interests of developers, planners, residents, and service providers, providing sufficient incentive for residents to use on-site carsharing services without increasing parking supply.

Finally, this report recommends models for setting policy on carsharing. One model could be designed to cater to a large city with high density (e.g., San Francisco). Another could be designed to aid moderately dense suburban communities (e.g., 7 to 10 residential units per acre), perhaps through the deployment of some traditional as well as emergent carsharing alternatives (e.g., peer-to-peer carsharing). Trip reduction in these areas might be achieved through the promotion of alternative modes of transportation along strategic transit corridors. Experience has shown that for traditional carsharing services to be successful, targeted residential areas must have moderate to high density, good transit access, and residents open to using alternative modes on a regular basis.

I. INTRODUCTION

In light of the increasing rise in motorization and the decentralization of activities away from urban centers, promoting alternatives to the use of the private auto is increasingly challenging for transportation planners. Yet meeting this challenge remains important, as the negative impacts of increasing auto use on cities and suburban areas are well documented (e.g., escalating traffic congestion, diminishing air quality).¹ In response to community concerns over the health hazards of these impacts, many local and regional governments have sought to curb private vehicle use, seeking practical, low-cost solutions.² While conventional demand management strategies have been widely used to mitigate some of the negative impacts of auto use, in the past few decades off-street parking policy and carsharing have emerged as two separate, credible alternatives for discouraging auto ownership and use.³

The off-street parking policy discussion has focused on the minimum parking standards adopted by almost all local governments in the United States. According to many critics, these minimum standards are set too high. This forces developers to oversupply parking, encourages the bundling of parking with housing, and ultimately results in free parking for 99 percent of all trips.⁴ While the removal or relaxation of these minimum standards is critical, complementary policies are also needed. These include policies to establish reasonable pricing of street parking, adopt maximum off-street parking standards, and facilitate alternative travel modes.

Carsharing offers individuals the possibility (by choice or otherwise) to depend primarily on transit and other alternative modes for most daily trips, while keeping the option to use an auto for special trips (e.g., shopping). Carsharing can support parking policy changes because it reduces demand for car ownership, and developers will be more likely to provide less off-street parking when carsharing is readily available, all else being equal. Conversely, carsharing could also benefit from parking policy changes. If minimum standards are removed or relaxed, the off-street parking supply is likely to decrease or grow at a slower rate. The unbundling of parking from housing is more likely to happen, and parking prices are more likely to increase. Given such changes, more people would have incentives to switch to carsharing or to use carsharing more frequently. Parking policy changes could expand carsharing outside its traditional central market where high-density development and rich transit services coexist. In short, carsharing and off-street parking policy appear to be mutually supportive, and this synergy can expand the geography of viable carsharing.

This report explores one specific policy initiative that could potentially connect the two policy fields and build on their synergy: the provision of on-site carsharing service in multifamily developments. This policy links carsharing and off-street parking through specific residential developments. If designed and implemented appropriately, on-site carsharing can facilitate the reduction of off-street parking and the expansion of the carsharing market. Given recent paradigm changes in parking policy and rapid growth in carsharing services, on-site carsharing has also begun to attract public attention, especially over the past five years. There have been efforts to introduce on-site carsharing programs in an increasing number of cities, spearheaded by initiatives in the San Francisco Bay

Area. The evaluation of these pioneering efforts can shed light on both the merits of and the needed enhancements to on-site carsharing.

While carsharing has expanded to serve other important urban markets in the Bay Area, including businesses, universities, and government agencies, this study focuses on residential on-site carsharing and its relationship to off-street residential parking. Nevertheless, it should be noted that in the case of the City of San Francisco, many of these carsharing markets are closely interrelated, often coexisting in the same area or building. For example, on-site residential carsharing is principally provided in high-density areas within or adjacent to the downtown, where carsharing has been made available to business and government employees, either voluntarily or in response to building conditions of approval. Thus, carsharing service targeted at one type of user can benefit other users.

This report evaluates the performance of current on-site carsharing programs in the San Francisco Bay Area by interviewing three main classes of stakeholders: developers, planners, and carsharing service providers. It explores the manner in which programs are being structured to more effectively achieve reductions in residential parking, especially in transit-rich, bicycle-friendly areas. Just as parking standards and carsharing programs need to be carefully tailored to local situations, on-site carsharing programs have to account for the differences in population density, geographic size, and the level of transit and bicycle provision among localities.⁵ In order to capture such variation, the interviews are scheduled in four different localities: the central city of San Francisco, Berkeley in the East Bay, and San Mateo and San José in the South Bay. Each of these cities has tried to ensure that residents are provided with a variety of mobility choices that allow them to avoid owning an auto, and each has bought into the need for on-site carsharing programs. They have employed different approaches, but are addressing common issues faced by other U.S. cities.⁶ Collectively, they represent the state of the practice in moderately dense, transit-rich, bicycle-friendly areas.

Based on 15 stakeholder interviews, we summarize key factors contributing to the relative success or failure of on-site carsharing programs, including the bundling or unbundling of off-street parking in the development, linkage to off-street parking standards, financial constraints, extent of transit service, and the degree of coordination among stakeholders. In general, on-site carsharing has been well accepted by developers, planners, and service providers. However, there are also clear gaps to fill between the on-site carsharing programs and off-street parking standards, and between the on-site carsharing programs and the carsharing business operations. Sometimes the reduction in parking demand resulting from on-site carsharing does not lead to a reduction in parking provision. In addition, service providers are often not aware of on-site carsharing developments and therefore miss out on business opportunities. An effective on-site carsharing program should coordinate the interests of developers, planners, and service providers. It should also provide sufficient incentives for residents to use on-site carsharing services without increasing parking supply.

While this study provides many insights into the role of carsharing in the reduction of off-street parking supply, there are some limitations to the study. It primarily focuses on

traditional carsharing in the San Francisco Bay Area, a rich and interesting case, but one that is not necessarily representative of all metropolitan areas in the United States. The developer interviews focused largely on developments in San Francisco, many of them in the South of Market and Mission Bay areas (south of downtown). Clearly, future research should explore residential carsharing in other metropolitan areas, and it should also examine the role of peer-to-peer and other emergent forms of carsharing.

II. CARSHARING: A TDM TOOL FOR MITIGATING IMPACTS

Carsharing is but one of a number of transportation demand management (TDM) measures available to planners and developers. In the United States, TDM encompasses a diverse set of transportation strategies that promote the effective and efficient use of existing and renewable resources in urban areas. Increasingly, planners and politicians have embraced TDM as a link through which to strengthen and coordinate the various components comprising regional transportation systems.⁷ For its part, carsharing proposes to decrease the rate of auto ownership by allowing members to reserve and make use of an auto on an as-needed basis; this service postpones or eliminates a member's need to buy an auto while greatly reducing his or her costs for purchase, insurance, maintenance, and storage.⁸

Rather than accepting a policy of expanding road space for private vehicles, TDM strategies advocate increased access to alternative options, such as transit, bicycling, or walking,⁹ conditions that are also complementary to the implementation of carsharing. In general, TDM strategies focus on increasing the proportion of travelers to private vehicles, utilizing existing facilities (e.g., transit infrastructure), and, often, placing restrictions and/or fees on the use of the automobile, except in special cases. In practice, TDM strategies have been developed to address travel demand for all locations, trip purposes, routes, modes, and times of day.¹⁰ The development and implementation of these integrated strategies normally entail a good deal of planning and negotiation with local authorities, transportation service providers, and businesses.¹¹

Carsharing clearly plays an important role in providing yet another alternative to full reliance on the auto, and it potentially can complement transit and the nonmotorized modes mentioned above. Carsharing has also been found to generate some significant environmental impacts. For example, one study reported that, based on Zipcar membership rates for Toronto, each carsharing vehicle removed approximately eight to ten private vehicles from the road.¹² Another milestone study by Martin and Shaheen evaluated changes in greenhouse gas emissions resulting from individuals participating in a carsharing organization. The study showed that as a system, "carsharing facilitates large reductions in the annual emissions of some households," which offset the small emission increases of other households.¹³

Carsharing has seen significant growth in both Europe and North America over the past decade. For example, according to one study, as of 2009, there were approximately 377,600 carsharing members in about 57 metropolitan areas throughout North America.¹⁴

III. ON-SITE CARSHARING: AN EMERGING TREND

The effect of carsharing on private car ownership and usage has been confirmed in the literature. The findings of more than a dozen studies, both by third parties and operators, indicate that each shared vehicle removes between 1.3 and 20 cars from the transportation network.¹⁵ This variation is due to several factors, including methodological differences, location specifics, and differing business models.

A number of studies have also focused on the links between carsharing and parking policy, often highlighting the importance of allocating public off-street and on-street carsharing spaces through a transparent process.¹⁶ One study analyzed public reaction to carsharing parking policies in the Bay Area, indicating that some residents are inclined to support the conversion of spaces for carsharing.¹⁷ For this reason, governments may want to promote the equitable allocation of parking among operators. In addition, greater public involvement is an important element.

Given the evidence that carsharing reduces private car ownership, parking policy advocates often recommend the reduction of parking standards for new development when carsharing is available.¹⁸ By 2009, Berkeley (California), Aspen (Colorado), Arlington County (Virginia), and the District of Columbia allowed parking reductions in exchange for TDM measures, including carsharing. However, this is done through negotiation, and not as of right. Seattle, Vancouver, and San Francisco have gone a step further and incorporated parking reductions for carsharing into their zoning codes. Toronto also appears to be moving in this direction. Each of these cities has tried to define a reduction ratio per carshare vehicle and a maximum cap for this reduction.

The City of Seattle's zoning ordinance, as updated in 2006, allows one space or up to 5 percent of the total number of required spaces under the minimum standard, whichever is greater, to be used for carsharing. For each carsharing space, the total number of required parking spaces is reduced by one. When a development is required to provide twenty or more regular parking spaces, one carsharing space can substitute for three regular spaces. This more substantial reduction requires an agreement between the property owner and the service provider, approved by the planning director, and the agreement must be recorded with the title to the property.¹⁹

In Vancouver, the zoning code allows the substitution of shared-vehicle parking spaces for required parking spaces, at a 1:5 ratio, up to a maximum of one shared parking space for every 50 dwelling units and two shared parking spaces for every 100 dwelling units, rounded to the nearest whole number. In the downtown area, the ratio remains the same, but the cap increases to six shared parking spaces for every 100 dwelling units.²⁰

San Francisco follows a different approach. It mandates carsharing vehicles in larger residential and commercial buildings, but doesn't require developers to reduce on-site parking. For example, the Rincon Hill Area Plan, a downtown neighborhood plan, requires new residential developments of over 50 units to offer the right of first refusal of at least one parking space to a carsharing organization. The planning regulation specifies that developers must provide one carsharing space for buildings with 50 to 200 units, and one

more space for each additional 200 units. Such carsharing spaces may substitute for any required regular residential parking, but will not reduce the required spaces further. The city planning regulation also waives carsharing parking spaces from the maximum standard in certain neighborhoods. It requires that the carsharing spaces be made available to carsharing organizations at no cost, and developers are required to pay for memberships (one per household) for residents in certain circumstances.

The City of Toronto uses a case-by-case process to grant parking reductions in developments with on-site carsharing. However, the City is preparing for a new zoning bylaw to provide better guidance. A consultant study recommends that each carsharing space replace at least four regular off-street spaces. The number of carsharing spaces should be the greater of $4 \times (\text{the total number of units} / 60)$, rounded down to the nearest whole number, or one space. The study also suggests that the carsharing spaces should not count toward the maximum standard, up to 10 percent of the maximum number of parking spaces allowed.²¹ The last policy considers the fact that some developers may want to go beyond the maximum parking standard. Instead of granting an exception, this policy allows them to provide carsharing spaces to meet the expected high parking demand from residents. Similar to San Francisco, Toronto also encourages conversions from regular parking to carsharing parking, but not vice versa. Given the latter is actually easier to do, the suggested zoning stipulates that 67 percent of the converted spaces should be for visitors and 33 percent for residents. However, the enforcement of this rule can vary depending on the parking arrangement between the developer and property purchasers.²²

As of May 2012, the new zoning bylaw has not been adopted by the Toronto City Council; however, the City has received development applications that have included carsharing spaces per the proposed bylaw. These developments have not followed the proposed zoning changes discussed above, but rather, they have taken a zoning variance approach. For example, at a 50-story mixed-use development, one carsharing space replaces ten regular spaces. When residents do not purchase a regular parking space, the building owner has to provide free membership or initiation to the carsharing organization operating in the building. In all, five separate developments in Toronto follow this rule.²³

Table 1 summarizes the maximum number of allowed carsharing spaces and the maximum reduction of regular spaces in the four cities discussed above.

Table 1. Comparison of On-Site Carsharing in Four Cities: Maximum Allowed Carsharing Spaces and Maximum Allowed Reduction in Minimum Required Parking

Size of Development	Seattle			Vancouver			San Francisco			Toronto (Proposed)		
	Max. Carsharing Spaces	Max. Parking Reduction	Max. Carsharing Spaces	Max. Carsharing Spaces	Max. Parking Reduction	Max. Carsharing Spaces	Max. Carsharing Spaces	Max. Parking Reduction	Max. Carsharing Spaces	Max. Carsharing Spaces	Max. Parking Reduction	Max. Parking Reduction
10 units	1	1	0	0	0	0	0	–	1	1	1	1
30 units	2	5	1	3	3	0	0	–	1	1	2	2
60 units	4	11	1	3	3	1	1	–	1	1	4	4
120 units	8	23	2	6	6	1	1	–	2	2	8	8
250 units	16	47	4	12	12	2	2	–	5	5	17	17
450 units	28	84	8	24	24	3	3	–	8	8	30	30

Source: Recreated from IBI Group, *Parking Standards Review: Examination of Potential Options and Impacts of Car Share Programs on Parking Standards, Final Report* (Toronto, Canada: IBI Group, 2009), http://www.toronto.ca/zoning/pdf/car_share_2009-04-02.pdf (accessed May 2012).

IV. ON-SITE CARSHARING IN THE SAN FRANCISCO BAY AREA

In the past decade, the San Francisco Bay Area has become a center for both carsharing and parking policy reform. Carsharing began with the arrival of City CarShare as a provider in 2001. According to Cervero and Tsai,²⁴ by September 2002, there were just over 1,800 carsharing members in the region, almost all of them in the City of San Francisco. While the service initially was limited to high-density areas in downtown San Francisco, the organization soon expanded to established communities in the East Bay. Within five years, two additional providers, Zipcar and Flexcar, had introduced services in San Francisco, resulting in significant growth between 2008 and 2010.²⁵ (During this period, Zipcar purchased Flexcar.) In 2010, there were an estimated 50,000 carsharing members and 1,100 shared-use vehicles in the entire San Francisco Bay Area.²⁶

Outside of San Francisco, Oakland and Berkeley were the first cities in the region to embrace carsharing, expanding the availability of this new alternative to residents through the promotion of carsharing in new developments near Bay Area Rapid Transit (BART) stations, such as in downtown Berkeley. In other suburban communities, carsharing is still in its infancy, with the promotion of services in new development near rail (e.g., Hayward Park Caltrain Station in San Mateo) or at major educational institutions, such as San José State University. In addition, Zipcar has established a presence at Stanford University, Santa Clara University, and California State University–East Bay.²⁷ While many of these communities have learned from the experiences of San Francisco, Oakland, and Berkeley, they have been faced with new challenges unique to local development patterns.

Besides the two traditional carsharing service providers, Zipcar and City CarShare, other alternative forms of carsharing have emerged. Peer-to-peer (P2P) carsharing allows private car owners to make their vehicles available for others to use. Providers such as RelayRides and Getaround have pioneered P2P in San Francisco, providing members with online access to private car owners interested in renting out their cars for payment. While P2P may eventually be promoted at the local level, many agencies want to fully understand its scope before they support it, as it is better suited to moderate-density residential areas, where the traditional carsharing model may not work as well.

Another carsharing alternative is one-way carsharing, which was recently introduced in Austin and Vancouver. Unlike traditional carsharing services (like Zipcar and City CarShare) that require users to pick up and drop off the vehicle in the same location, one-way carsharing services allow members to return the vehicle to a different location. However, this alternative does not appear to have as complementary a relationship with transit and other alternative modes as P2P and traditional carsharing do, as it tends to facilitate car use for more trips. For this reason, the City of San Francisco is hesitant to promote one-way carsharing, especially in densely populated areas where traditional carsharing has successfully been coordinated with other alternative modes.

Over the past decade, the City of San Francisco has spearheaded carsharing policy changes and other cities in the Bay Area have typically followed suit. The City of San Francisco instituted its first minimum off-street parking standard in 1955. In 1968, it adopted a “soft maximum” where developers can provide no more than 150 percent of the minimum required number of spaces as accessory.²⁸ The City adopted the “Transit First” policy in 1973, providing the theoretical foundation for many of the parking policies initiated later on. Starting in 1997, the City began to eliminate the parking minimum in some downtown districts and instituted parking maximums, including in the Downtown Residential (DTR), C-3, Neighborhood Commercial Transit (NCT), and Residential Transit Oriented (RTO) Districts (see Planning Code, Section 151.1). These changes reflect the City’s overall goal to decrease the number of cars, to maximize the efficiency of limited land in a dense area, and to encourage alternative travel options. Table 2 lists these neighborhoods and the details of the parking standard.

It is no surprise that on-site carsharing has been implemented in many residential developments in the City of San Francisco and other cities. Carsharing provides users access to a shared vehicle fleet for short-term use during the day, reducing the need for private vehicles;²⁹ however, while the provision of on-street and public off-street parking dedicated to carsharing is important to a sector of the population in San Francisco, it is important that carsharing also cater to the needs of residents by providing the convenience of on-site carsharing vehicles. On-site, residential carsharing achieves this objective, while adding to the availability of shared vehicles.

In most cases, the growth of residential carsharing in San Francisco has been the result of market forces rather than public policy intervention. We surveyed all carsharing locations in the city by both City CarShare and Zipcar, and we found a total of 307 carsharing pods by May 2011. (A pod is a dedicated carshare vehicle location.) Eighty pods (26 percent) are on residential properties; of these, 52 pods were retrofitted into existing buildings.

In the Bay Area, some developers have been willing to provide additional carsharing spaces in their developments, even when it is not a requirement. In one case, a developer actually provided carsharing on its own (without assistance from a carsharing service provider). These developers view the provision of carsharing spaces as a perk that can attract prospective buyers. Many new tenants in these buildings are already carsharing members or plan to join in the near future. Buildings that offer on-site carsharing also allow current and potential users to access these vehicles on site (without having to go to a separate carsharing facility).

In terms of policy, promoting on-site carsharing is often one part of the overall strategy to encourage carsharing development. The policy focus has always been the provision of cheap and reliable carsharing facilities. As a survey of carsharing operators worldwide found out, “provision of parking spaces is often the most important way that local authorities and developers can support carshare clubs.”³⁰

In San Francisco, where carsharing has been prevalent, most policy interventions have responded to a specific need, such as the provision of carsharing as a condition of building approval.³¹ As a result, the City is presently coordinating efforts to provide a

comprehensive view of carsharing and its many submarkets in San Francisco. The San Francisco Planning Department is the primary agency responsible for ensuring that new developments provide a specific number of carsharing spaces to their residents, as a way to encourage an alternative to car ownership.³² In addition, prior to its closure in February 2012, the San Francisco Redevelopment Agency promoted the inclusion of carsharing spaces in residential project garages.³³

The two main policy documents supporting on-site carsharing are comprehensive plans and the planning code. The San Francisco General Plan is a coherent set of thematic elements and area plans. Elements and area plans adopted in the past five years encourage the provision of carsharing as a viable alternative to private car ownership, consistent with the City's Transit First policy. These policy documents include the Housing Element; the Eastern Neighborhoods, Market and Octavia, Rincon Hill, and Balboa Park Area Plans; and the Executive Park Subarea Plan (see Appendix A).³⁴

Over the past decade, the San Francisco Planning Code has developed carsharing provisions. As conditions for permit approval, new building sponsors and owners are required to provide separate carsharing spaces in their garages, as detailed in Planning Code Sections 151.1, 157, 158.1, 163, and 166 (see Appendix B). This requirement is based on the size of the garage and the local zoning district.³⁵ While much of the focus was initially on ensuring that new commercial buildings in office districts provide carsharing as an additional element of their required TDM programs, Planning Code requirements have been expanded to include many new residential developments in communities located in the city's northeast quadrant.

In other Bay Area cities, carsharing services have either been introduced or are in the process of being introduced. Our research has shown that carsharing in general and on-site carsharing in particular has been limited to central areas with good access to transit services. The cities of Oakland and Berkeley have worked closely with residential developers, encouraging or requiring them to set aside a small number of carsharing spaces in their building garages. In other cities, like San José and San Mateo, city planners have begun to formalize policies supporting the provision of on-site carsharing facilities, particularly in areas of moderate density.³⁶

Through various sources, such as City CarShare reports, Planning Department reports, and service provider websites, we identified 54 new residential developments in the Bay Area that include on-site carsharing. As of 2011, 32 were completed, while the rest were either approved or under construction. The vast majority (48) are in San Francisco. Most developments provided between one and four carsharing spaces. Appendix C lists these 54 developments with a brief description of each.

Table 2. Adoption of Maximum Parking Standards in San Francisco

Year	Neighborhoods	Description	Parking Maximum	Exceptions Allowed?
1998	Mission Bay	Redevelopment Area	1 space per unit	None specified.
2005	Rincon Hill (DTR)	High-Rise Residential, adjacent to downtown	0.5 spaces per unit	Up to 1 parking space per unit through Planning Commission review if spaces are operated with mechanical stackers or valet. Requires unbundling of parking.
2006	Downtown (C-3)	Dense Commercial/Office/High-Rise Residential	0.75 spaces per unit	Allows maximum of 1 parking space per unit for units with 2 or more bedrooms.
2008	Mission East SOMA Central Showcase Square/Potrero	Residential, east of downtown	0.5 to 0.75 spaces per unit	Up to 0.75—1 parking space per unit through Planning Commission review if spaces are operated with mechanical stackers or valet.
2008	Market and Octavia	Residential/Commercial, adjacent to downtown	0.75 spaces per unit	Allows maximum of 1 parking space per unit for units with 2 or more bedrooms.

Source: Recreated from Alyssa Sherman, "The Effects of Residential Off-Street Parking Availability on Travel Behavior in San Francisco" (master's thesis, San José State University, May 2010).

V. DEVELOPERS, PLANNERS, AND PROVIDERS

To better understand the provision of on-site carsharing in multifamily developments in the San Francisco Bay Area, we interviewed 15 professionals from three of the stakeholder groups: carsharing service providers; government agencies responsible for overseeing development; and building developers responsible for providing carsharing services to their tenants, either voluntarily or as a requirement.

The interviews were conducted over a six-month period, from April 2011 through October 2011. Developers were selected based on having completed one or more projects with on-site carsharing. These projects are in San Francisco, Berkeley, and San Mateo in various neighborhoods with a wide variety of densities, levels of transportation investment, and varied mobility needs. Table 3 compares the socioeconomic characteristics of the three cities plus San José, where the local government is proposing a policy related to on-site carsharing. In total, eight developers from the three cities with on-site carsharing projects were interviewed.

Table 3. Socioeconomic Characteristics of Bay Area Case Cities

City	2010 Population	Avg. Density (pop. /sq. mi.)	2010 Median Household Income	Rail Network (system mi.)
San Francisco	805,235	17,179	\$65,519	78.0
Berkeley	112,580	10,752	\$57,189	6.0
San Mateo	97,207	8,014	\$79,820	4.5
San José	945,942	5,300	\$76,963	43.5

Sources: 2010 Census; Mileage estimates based on Google Maps.

Interviews with planners from all four cities were conducted. Regarding service providers, we were able to interview two representatives, one from City CarShare and one from Zipcar. Developers, planners, and providers were contacted either by email, U.S. mail, telephone, or a combination of these methods, and they were invited to participate in an interview. Table 4 lists the interviews by geographic location.

Table 4. Geographic Distribution of Stakeholder Interviews

City (County)	Developer Interviews	Planner Interviews	Provider Interviews ^a
San Francisco (San Francisco)	5	2	
Berkeley (Alameda)	2	1	
San Mateo (San Mateo)	1	1	2
San José (Santa Clara) ^b	0	1	

^a Two separate interviews were conducted, each with a different regional service provider.

^b As of late 2011, San José had not yet approved an official policy on carsharing.

All interviews were either administered in person or over the telephone, depending on the availability of the respondent to meet in person. Respondents were read each question individually and subsequently provided answers. In each case, at the beginning of the interview respondents provided background information on the company or agency where they worked. The developer survey consisted of the following components (see Appendix D):

- Basic information
- Opinion questions concerning carsharing
- Reasons for pursuing carsharing
- Design of carsharing programs
- Demand for carsharing
- Concluding remarks and recommendations (open ended)

Both the planner and carsharing provider interviews were slightly shorter and were focused a bit more on aspects specific to each of these stakeholder groups. The information collected from all the interviews enables us to understand both the success and problems of current on-site carsharing provision in the Bay Area.

DEVELOPER SURVEY RESULTS

In general, all developers had either implemented carsharing in their buildings or had proposed plans to include carsharing (but had not yet begun to construct or complete their building). At the time of the survey, over half of these respondents had already built one or more buildings with carsharing spaces, and all were familiar with carsharing. While most of the developments were considered high density, they varied in size and type: some developments had less than 100 units, while others had more than 250 units; some were high- to moderate-end market-rate apartments, while others were affordable housing units for low-income residents. While many of the proposed or built properties surveyed were located near downtown San Francisco, a few were located further out.³⁷

Parking

In terms of parking, all developments included on-site carsharing spaces in garage facilities, normally on the ground or basement level (except for the proposed Capitol Avenue project, which was designed with surface parking). Parking facilities varied in size, often based on the size of the building, although in San Francisco the ratio of parking spaces to units was often below 1:1, by regulation. Despite an industry trend toward separately charging residents for parking facilities (unbundling of fees), some of the buildings surveyed still bundled housing and parking costs together. Most buildings surveyed were designed to provide one or two carsharing spaces, depending on the size and/or local requirements; however, in a few cases, even more spaces were planned on a voluntary basis. A few

respondents remarked that an advantage of carsharing is the ability to use parking more efficiently, reducing the required space for parking in dense urban environments.

Developer Views on Carsharing

While most respondents were generally pleased with the emergence of carsharing in dense urban areas with low car ownership, many remarked that some of the local government regulations needed improvement. For example, a few developers commented that parking requirements should be lowered and that cost savings should be passed to the buyer or renter. Some developers felt that carsharing regulations for developers are problematic and that requirements for providing a specific number of carsharing spaces in garages should either be lowered or eliminated (i.e., replaced with incentives to the developer). Others argued that government intervention should reflect local demand for residential parking and market conditions.

Nevertheless, most developer respondents had a favorable view of carsharing. They overwhelmingly felt that it works best in high-density neighborhoods near transit, as there is far less demand for carshare in suburban areas (e.g., Marin County). A few also remarked that it is especially attractive to younger residents and/or to transit-dependent individuals that do not own a car. In contrast, most luxury developments would see little demand for carsharing. One respondent felt that carsharing has more potential for success in mixed-use buildings, as opposed to purely residential developments. Most respondents saw carsharing in a positive light, as a tool through which to market their project to the public, government regulators, and would-be buyers.

Provision of Carsharing

In their own developments, most developers stated clear reasons for providing carsharing spaces. While a few mentioned regulatory reasons (imposed by San Francisco and Berkeley), most viewed carsharing as being beneficial to the surrounding neighborhood and generally “the right thing to do.” Again, some developers also saw carsharing as a valuable marketing tool for potential buyers and a way to earn important Leadership in Energy and Environmental Design (LEED) green building credits.

An obstacle often cited by developers is the cost of providing a carsharing space in a residential garage. Among the survey respondents, the cost per space ranged from \$20,000 to \$100,000, depending on the construction of the building. For example, one developer claimed that a parking space in a garage with stacked parking costs about \$30,000, while another quoted higher costs if carsharing spaces need to be separated from other garage parking (to alleviate the security concerns of residents). In addition, costs are higher if electrical vehicle charging facilities are installed. In contrast, one respondent mentioned that the cost of providing a space is not significant when surface parking is proposed.

In the area of security, most respondents reported that at the outset there were concerns surrounding nonresident access to carsharing spaces. Over half of these developers felt more secure as time passed with no security incidents, a few developers expressed continued concern, and one respondent reported no concerns from carsharing users.

Providers argue that it is not feasible for carsharing spaces in garages to be made accessible only to members living in the building. In most garages, however, nonresident carsharing members only have access to the carsharing spaces, which decreases security risks.

Financial Considerations

Some of the developers reported that financial institutions see carsharing as a benefit and are thus supportive of it. However, one respondent felt that these institutions are less interested in carsharing, but are eager to support green development projects, which often include carsharing. Still, some developers claimed that banks and investors either want adequate parking for all units as a condition of financing, or they look critically at the costly provision of carsharing spaces.

Once financing is acquired for the building, developers must work out arrangements with the carsharing providers. In its efforts to maintain a sustainable carsharing operation, the provider must ensure that the development is located in a densely populated area, or in close proximity to established carsharing spaces. Some developers reported that they are often not in a strong position to negotiate the terms of carsharing provision. The providers often require guarantees that minimum revenues will be achieved. In addition, the provider is often not interested in committing resources until the project is developed. One respondent reported that a carsharing provider expressed concern over the isolated location of the development in relation to other carsharing spaces. However, one developer with a long history of carsharing involvement reported having a good working relationship with one provider.

Access to Carsharing

Another issue of great concern to developers is the degree to which the availability of carsharing actually influences a resident's decision to own a car. While low-income and student residents in these developments often do not own a car (and occasionally access a car through carsharing), most of the respondents agreed that carsharing often keeps other residents (particularly those with higher incomes) from buying a second or third car. One respondent mentioned that residents are known to move to a residential development for the sole purpose of having direct access to an on-site carsharing space.

However, while carsharing improves residents' access to cars, levels of utilization are often difficult to predict. For example, one respondent reported that a carsharing space at Eighth and Howard Streets quickly became one of the most highly utilized locations, but resident usage of this space remains fairly low. Based on past experience, another respondent concluded that only a building of more than 300 units will generate sufficient demand to justify provision of a residents-only carsharing space; in smaller buildings, additional demand will need to come from nonresident members. Nevertheless, most respondents concluded that levels of demand for carsharing are higher than they were five years ago.

Recommendations for Government Action

Finally, based on their experiences, survey respondents were asked to provide specific recommendations to local government. Some developers felt that the government should not require the provision of carsharing, as it places the developer at a disadvantage in negotiations with the carsharing provider (i.e., it takes the free market out of negotiations). In contrast, some developers felt that government should encourage the provision of carsharing spaces and that the number of spaces should be determined by the market, not the government. One respondent reasoned that if the demand is not justified, then requiring more than one carsharing space prevents those spaces from being rented out to others, often resulting in losses to developers or owners. Other respondents mentioned that government should provide developers with incentives to provide carsharing, such as reduced permit fees or expedited processing (e.g., for projects pursuing LEED certification). Others felt that governments should focus on providing carsharing on the street or in public parking lots. One developer reasoned that carsharing should be required by state law, but that cities should let the developers decide the appropriate amount of parking.

PLANNER SURVEY RESULTS

Planners from four Bay Area cities were surveyed: San Francisco, San José, Berkeley, and San Mateo. Interview questions were similar to those used in the developer interviews, with a few minor exceptions.

While all four jurisdictions encouraged the provision of carsharing in a select number of downtown developments, the cities have very different residential densities. San Francisco, with the highest densities in the region, has seen carsharing expand in downtown residential developments over the past decade. The remaining cities have seen far less high-density development and have thus tended to follow a more voluntary approach. In both San José and San Mateo, there is very little carsharing service available, and the plan is to initially promote it on a voluntary basis. Berkeley, on the other hand, has had greater exposure to carsharing, as a few developers (e.g., Patrick Kennedy) took an interest in carsharing in the early 2000s. For this reason, a number of residential developments there now have carsharing facilities.

Government View of Carsharing

Government approaches to carsharing and its role in reducing car ownership vary among the cities surveyed. In San Francisco, where regulations were initially adopted in 2005, carsharing was made mandatory for high-density developments in the downtown. More recently, however, regulations have been expanded to include all development of more than 50 residential units (based on building capacity). While widely viewed as stringent, these regulations are incentive based, providing the developer or building owner with the flexibility to convert parking spaces that are not counted against the City's parking cap.³⁸ Also, the Planning Commission has allowed additional parking in exchange for free carsharing membership for building tenants.

In contrast, each of the remaining cities has seen far fewer projects with carsharing. With the exception of Berkeley, these cities are still testing the waters to make sure that the

density is sufficient to justify applying carsharing regulations. For now, they have decided to heavily promote carsharing in new developments near transit, where carsharing is being promoted as an effective TDM tool for meeting trip reduction requirements. San Mateo has approved only one, unfinished, transit-oriented development (TOD) project with carsharing, in an area along the Caltrain corridor that the City has targeted for trip reduction. In San José, planners are still in the process of developing carsharing guidelines for development in the downtown. These guidelines may be developed in conjunction with the unbundling of parking.

In Berkeley, carsharing is but one of the measures identified by the City as an effective tool for achieving its trip reduction goal. While Berkeley's regulation of on-site carsharing provision has been ad hoc, it is considering new zoning ordinance measures for the downtown that would have mandatory requirements for new development to provide carshare spaces and memberships for tenants. Some members of the City Transportation Commission would like to extend the mandatory requirements to other areas of the city with high levels of transit service. The proposed downtown zoning provision would also grant a 2 percent reduction in parking requirements for developers who provide more than the code-required carshare parking.

Importance of Parking Policy and the Introduction of Carsharing

Each of the four cities surveyed has a different perspective with regard to parking and the role of carsharing. In San Francisco, the overall philosophy is that private auto ownership is part of the larger transport system. In general, city policy supports reducing vehicle miles traveled (VMT), discouraging use of the private auto, and augmenting the network of accessible carsharing facilities.³⁹ Thus, while the City has historically had minimum parking requirements, in the past decade it has moved away from parking minimums in favor of parking maximums. It has also made an effort to unbundle parking costs from housing costs in new residential projects,⁴⁰ which can facilitate carsharing.

San Mateo used to be somewhat rigid in its minimum parking requirements. However, in its efforts to reduce car traffic, it has become increasingly flexible, allowing developers to reduce parking supply below the standard of one space per residential unit. While the City continues to have minimum requirements of one space per unit for developments built in most areas of the city, within the TOD area, requirements are applied on a case-by-case basis. When less than one parking space is provided per unit, residents are not automatically given parking, but instead must explicitly choose to pay for it. This unbundling of parking costs in the TOD corridor has clear implications for a new approach to parking by the future homeowners association. Depending on how and to whom unbundled parking spaces are sold, these associations will probably shift their focus away from parking, as it will no longer be an essential element of the resident package.

The City of San José is discussing the issue of unbundling parking for residential properties in the downtown; however, it will be a challenge for city officials to convince developers that they do not need to provide as much parking as in the past. According to the San José respondent, the City will introduce legislation to lay the groundwork for recognizing carsharing as an effective TDM tool. Given that San José does not yet have a project featuring carsharing, the City will want to both lower parking requirements in the downtown

and begin to introduce developers to carsharing. San José State University may be a place to start, as it is interested in piloting a program.

In Berkeley, planners believe that carsharing can play a role in residential development, as a tool for reducing car ownership and use, as well as parking demand. For example, Berkeley has begun to establish minimum parking requirements that are below the Institute of Transportation Engineers (ITE) parking generation rates, effectively reducing parking ratios. The City is in favor of unbundling parking costs from housing costs and may introduce a carsharing requirement in the outlying neighborhoods once the downtown carsharing requirement has been implemented. According to the Berkeley respondent, carsharing has been successful from all points of view, although demand has been less than initially predicted. In addition, demand among students at the University of California at Berkeley seems to be low, as many can walk or ride bus transit for no out-of-pocket cost with a University ID card.

Advantages, Disadvantages, and Costs of Requiring Carsharing

The survey respondents were asked to identify the advantages and disadvantages of carsharing provision, as well as the costs incurred. The San Francisco planners indicated that carsharing benefits people by allowing them to live in a car-free environment, and it breaks down barriers that often force people to own a car for occasional trips. They saw no disadvantages to carsharing. In terms of costs, they reported that the principal costs of providing on-site carsharing in residential projects are three-fold: capital construction costs of providing carsharing spaces that are segregated from other spaces; opportunity costs of providing spaces that could otherwise be sold or leased; and operational costs of maintaining spaces and providing access (by key or valet, in some cases).

The San Mateo planner explained that the key advantage of carsharing for the developer is the possible reduction in parking for physical projects, which can free up space for other project investments. The planner also indicated that carsharing can reduce the number of project-generated trips, which benefits society as a whole by reducing congestion, pollution, and noise. In contrast, the respondent felt that one disadvantage was that, if miscalculated, demand for parking could result in the overflow of parking into the immediate neighborhood. In terms of costs, the respondent was of the opinion that carsharing does not incur additional costs, as it is an efficient use of the site.

In part due to the fact that San José has yet to establish carsharing regulations, the San José respondent was brief in her assessment of advantages and disadvantages. She pointed out that an advantage of on-site carsharing is the convenience that it provides residents. The only disadvantage cited was the difficulty for nonresidents to access carsharing. In terms of costs, the respondent only mentioned the opportunity costs of converting (or assigning) carsharing spaces that would otherwise be sold or leased.

Similarly, the Berkeley planner felt that a key advantage of carsharing is that it makes access as convenient as actually owning a car and parking it in the building garage. He saw disadvantages in the provision of access to nonresident carsharing members, as well as the prospect of the space being wasted if demand for a carsharing space does

not materialize. Nevertheless, the planner did not believe that the provision of spaces for carsharing should be viewed as a major cost concern for developers.

Roles of Developers and Service Providers

Another topic covered by the planner survey was the interface between the planners, the developers, and the service providers. This relationship has been firmly established in San Francisco, where each player has a defined role in the provision of residential carsharing. One of the San Francisco planners noted that developers are generally either supportive of carsharing or are indifferent to it. The same respondent remarked that service providers are supportive of new opportunities to provide carsharing, as long as they are financially sustainable.⁴¹

Similarly, in San Mateo and Berkeley, developers are largely supportive of carsharing. For example, representatives of the City of San Mateo have discussed on-site carsharing with transit-oriented development sponsors. These developers see carsharing as a viable alternative that provides flexibility. In the case of Berkeley, developers were said to be supportive of carsharing; however, planners voiced some concern that other, more competitive carsharing providers (e.g., Hertz) could enter the market without truly advocating environmental objectives (e.g., trip reduction). In the case of San José, carsharing is in its infancy and the city respondent was unaware whether developers and providers were supportive.

When asked whether cooperation between developers, service providers, and government agencies could be improved, respondents from San Francisco and Berkeley believed that clearer direction from government agencies would facilitate the proposal process, as it would ensure the uniform treatment of developers and give this group some predictability. For example, in San Francisco, as part of the planning approval process for new developments, applicants with carsharing requirements must choose a department-approved provider. Respondents from San Mateo and San José, where carsharing is only now starting up, both said that it is too early for them to comment on stakeholder relations.

Impact of Carsharing Regulation

Another interesting area of discussion with respondents was the perceived impacts of carsharing in their communities. In the case of San Francisco, the respondent acknowledged that the regulation of carsharing had made an impact on parking in the city, providing an alternative to individuals that only need a car occasionally. However, he was unable to provide data on increases in member use (i.e., residents versus nonresidents).⁴² In Berkeley, the response was similar, with the respondent again acknowledging that carsharing had increased citywide, but not having data on the level of increased use by resident and nonresident members. The respondent from San Mateo remarked that the creation of a TDM requirement in the TOD corridor had increased the need for carsharing in the area, although it was too early to know to what extent. Finally, the planner from San José abstained from commenting on the topic (on the basis of inexperience).

Recommendations

As in the developer survey, city respondents were asked if they had recommendations concerning the provision of on-site carsharing in residential development. The San Francisco respondent remarked that carsharing is now at the forefront of city policy. He felt that the City should continue to regulate development, as the provision of carsharing is market driven. Similarly, the respondent from Berkeley was in favor of formalizing requirements so that developers could be treated equally and new developments could reap the benefits. Finally, the San Mateo respondent pointed out that in working with developers, it is better if they can be assured at the outset that the amount of parking required can be negotiated.

PROVIDER SURVEY RESULTS

The two principal carsharing providers operating in the San Francisco Bay Area, City CarShare and Zipcar, were surveyed by the authors. One-on-one interviews were conducted with the local directors of each company. Interview questions were based on a preestablished guide that allowed the respondents to expand on specific points (see Appendix E).

Over the past decade, City CarShare (CCS) has been working with planners from San Francisco, Oakland, and Berkeley to modify parking policies. Their efforts have focused on reducing standard parking requirements and promoting transit-oriented carsharing. A mixed-use project at Eighth and Howard Streets in San Francisco was the first residential development in the city to include a CCS space (2003).⁴³

In 2009 and 2010, CCS undertook a study to understand the impacts of carsharing.⁴⁴ A regionwide survey of its members found that while 23 percent of members drove alone to work, 32 percent commuted by transit (public modes and private shuttle/bus), 27 percent walked, and 1 percent biked (see Figure 1). These results clearly show that a vast majority of CCS members primarily rely on an alternative mode of transport for commuting to work.

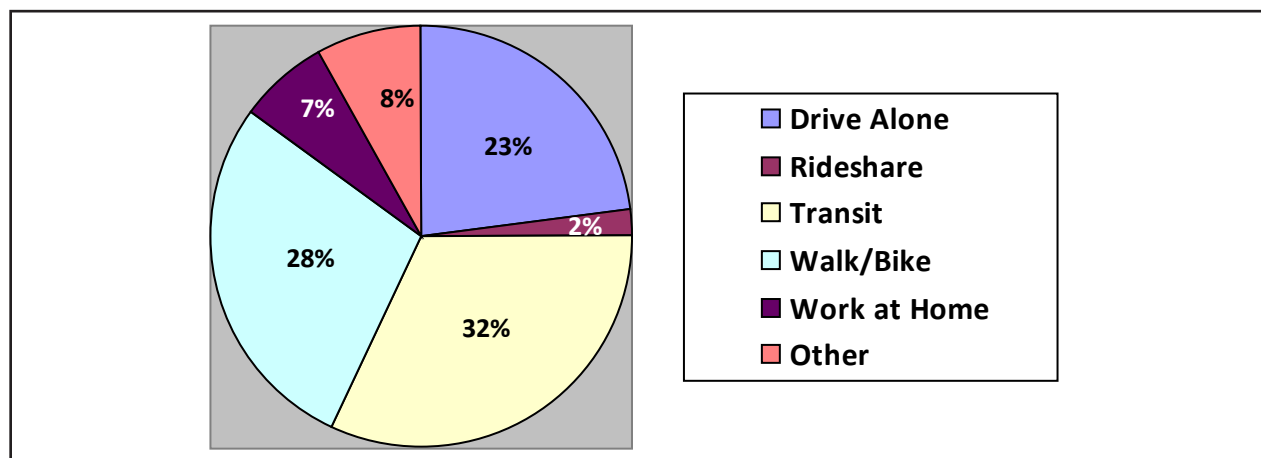


Figure 1. Commute Mode of City CarShare Members

Note: N=298.

Source: City CarShare, *Getting More with Less: Managing Residential Parking in Urban Developments with Carsharing and Unbundling* (San Francisco, CA: City CarShare and Nelson Nygaard, December 2011).

CCS has played an important role in ensuring that carsharing is primarily a tool for discouraging automobile ownership. The organization has formed an alliance with a number of nonprofit carsharing providers in North America and Australia, and it has published material on best practices. It has also supported the efforts of the CarSharing Association (CSA) in adopting a code of ethics for carsharing organizations throughout North America. CCS is also working with TransForm, a nonprofit organization advocating transit and walkable communities in the Bay Area and beyond.

In contrast, Zipcar is a Boston-based carsharing company that provides services in a number of U.S. and European markets, including Atlanta, Baltimore, Boston, Chicago, London, New York, Philadelphia, Pittsburgh, Portland, Seattle, Toronto, Washington D.C., and Vancouver. Founded in 2002, the company launched services in the San Francisco Bay Area in 2008, shortly after it merged with one of its former competitors, Flexcar. According to a company representative, each Zipcar in operation takes about 15 private vehicles off the road.⁴⁵

In the past four years, Zipcar's Bay Area fleet has grown steadily, from 200 vehicles in 2008 to 1,200 in 2012, featuring at least 31 different vehicle types. Zipcar did not provide membership totals for the San Francisco Bay Area; however, the organization has a total of some 605,000 members in 16 different U.S. markets.⁴⁶ In 2011, Zipcar showed just how much it had grown, making an initial public offering (IPO) on the stock market.

Principally, Zipcar features a member focus, closely keeping tabs on where members live and work, as well as where vehicles are located, by city zone and census tract. Zipcar believes that the following factors influence the local carshare market:

- Density
- Cost
- Commute time and cost
- Household size
- Proximity to transit
- Local topography
- Type of building (mixed use over other uses)⁴⁷

The provision of carsharing can reduce vehicle trips and achieve GreenTRIP certification. This new certification program rewards multifamily, mixed-use infill projects that apply strategies to reduce traffic and greenhouse gas emissions. Both CCS and Zipcar have supported policy efforts in the Bay Area and other metropolitan areas throughout the country to reduce vehicle emissions through the inclusion of alternative fuel vehicles in their fleets. About 40 percent of the CCS fleet is currently either electric or hybrid, but the organization hopes to increase this figure to 60 percent by 2015.

CCS has advocated parking reductions and the unbundling of housing and parking costs. With a grant from the Federal Highway Administration, CCS and Nelson Nygaard (a consultant) developed a best practices guide for residential projects. The guide includes a survey of residential projects in downtown San Francisco and the adjoining Mid-Market/South of Market mixed-use area that explores whether the availability of carsharing or unbundled parking changes residents' driving behavior.

Existing Conditions

Currently, five to ten new residential projects in the San Francisco Bay Area have CCS pods. Other developers have been in contact with CCS, but prefer to wait until after construction to sign a memorandum of agreement with the organization. About 95 percent of all CCS pods in residential projects are located in San Francisco, which is clearly a result of the City's requirements that new residential development in large buildings include carsharing. In most cases, CCS pods are located near regional or local transit (e.g., within a quarter mile or even a half mile of a transit line or station).

Most CCS pods have from one to five vehicles, while residential pods usually have one to three. CCS desires a network of multiple smaller pods (one to two vehicles) throughout a neighborhood rather than one large, centralized pod. Most CCS pods in residential buildings are located adjacent to resident parking, except for the SOMA Grand building, where the pod is separate from residential parking.

According to CCS, it is important to work with developers and architects early in the process so that the carsharing pod is convenient for residents and customers coming off the street. Other concerns include the following:

- **Car lifts:** Theoretically, CCS claims it is unhappy with car lifts for its vehicles, due to the greater potential for damage and increased inconvenience.
- **Convenience:** Carsharing spaces should be very convenient, and it should be easy to enter and exit the garage with minimal obstructions.
- **Security:** CCS installs its own security technology at each garage, so that any CCS customer can use his or her key to access the garage. In some cases, garage pods are physically separated from other garage parking spaces.

Similar information was not made available by Zipcar. However, based on a few site visits, it appeared that, in many cases, Zipcar had a higher number of cars per off-street pod than CCS. It is not known what percentage of carsharing spaces in the Bay Area are located in the City of San Francisco, but the proportion is relatively high.

Ideal Locations

Another issue discussed in the interviews was the need to provide guidance to new buildings on the ideal location of carsharing pods in garages. Both Zipcar and CCS prefer that on-site pods are easily accessible and visible to both residents and nonresidents. In

locations where the security situation for nonresidents is poor (e.g., access to the garage is through an alley or has poor lighting), carsharing pods may not be as successful, as they will rely only on residents of the building. Some projects are in good locations but are undermined by safety concerns. Service providers argued that for on-site carsharing to be successful, it is best to have a combination of residents and nonresidents, as it is difficult to cover operating costs if the pod solely relies on building residents. In addition, residential projects with free parking for residents are not as attractive for carsharing as projects with unbundled parking.

Ideally, CCS would like developers to market carsharing to future residents and provide a revenue guarantee. Depending on local conditions, CCS often asks the developer to sponsor membership for residents. For example, Broward Center in Berkeley provides free CCS membership to residents.

Advantages, Disadvantages, and Costs of Providing Carsharing

In an effort to better understand the trade-offs involved in successfully providing carsharing at on-site locations in new residential buildings, the service providers were asked to identify some of the major advantages, disadvantages, and costs to stakeholders and society in general. Respondents identified the following advantages:

- Carsharing allows residents to put off purchasing a car.
- Carsharing allows residents to put off purchasing a second car.
- Carsharing can reduce vehicle miles traveled.
- If carsharing is offered in conjunction with unbundled parking, it can reduce the cost of housing for those who do not own a car.
- Carsharing is one component of a broad set of transport policy tools.

On the flip side, a major disadvantage identified by CCS was that some people are left with a false impression that the goal of carsharing is to increase the amount of driving, when in fact it is not. For this reason, it is important that carsharing agencies clearly explain the role that carsharing can play in trip reduction (e.g., discouraging car ownership).⁴⁸

In assessing the capital costs that developers and building owners incur in providing carsharing spaces in their garages, the CCS respondent identified the following components:

- \$30,000 to \$50,000 per garage parking space
- \$1,500 to \$5,000 for electronic access units, with costs higher for retrofitting access units to existing buildings
- About \$500 to \$2,000 for marketing, plus an additional \$1,000 in incentives

- Additional cost for capital expenses related to electric vehicle charging (\$5,000 per charging station), depending on pod location and the number of cars⁴⁹

Design of the Program

While CCS and Zipcar often approach project developers that are required to provide carsharing, the organizations themselves are often approached by developers that may or may not have such requirements. Normally, the city does not get involved in the negotiations between the developer and the provider, so there is no formal tracking mechanism. Normally, contracts with developers are for five-year terms, with provisions for opt-outs. For some projects, the homeowners association or condo association may negotiate changes to the contract.

With respect to cost/benefit sharing mechanisms, guaranteed revenues are important. The developer and carsharing providers can agree to split the cost of membership or offer discounted membership rates to new residents within 60 days of purchase. In some cases, either the provider or the developer pays the full membership costs. Respondents pointed out that it is more effective to offer membership incentives when residents purchase a unit than it is to periodically reduce membership rates over an extended period of time.

Finally, the respondents commented that the manner in which cities communicate the carsharing requirement to the developer is very important. They stressed the need to notify the developer of all relevant parking requirements early in the design process, so that developers and sponsors can incorporate carsharing into the development. If a project is known to require carsharing, CCS provides materials to the developers or, if the project is already built, to the homeowners association.

Demand for Carsharing

The service providers agreed that the level of demand for carsharing largely depends on location. San Francisco has required carsharing in residential projects within the C-3 commercial zone, and because residential densities are fairly high in these zones (particularly in the northeast quadrant of the city), there has been sufficient demand. Nevertheless, as the carsharing requirement is extended citywide to neighborhoods of lower density, some new areas may not have enough demand.

With regard to on-site carsharing, the respondents remarked that property managers play a role in ensuring that buildings provide ongoing facility management. They said that well-utilized pods in residential projects have the following characteristics:

- Unbundled parking
- Presence of other carsharing providers in building and/or nearby
- Easy access and visibility provided for both residents and nonresidents

In addition, respondents mentioned that carsharing usage levels often depend on the location of spaces; ideally, cars are placed in an accessible location. Downtown pods are used more on weekdays, while neighborhood pods are used more on weekends.

Recommendations

The service providers concluded that, based on their experience, building developers tend to provide on-site carsharing for a number of reasons:

- To gain a competitive advantage over other residential projects
- To meet government-imposed requirements or guidelines
- To provide residents the convenience of having on-site access to carsharing without having to go on the street

The only suggestion that CCS had for local governments regarding on-site carsharing was that they provide ongoing notification of upcoming projects requiring carsharing, so that carsharing organizations can provide their services in a timely way. It is important for service providers to know when developments are approved, so that they can be prepared to open negotiations with a developer.

According to the Zipcar manager in San Francisco, the principal barrier to growth of carsharing is a lack of parking availability. He feels that one action that could expand market share would be to equitably allocate parking among all certified carsharing firms (e.g., Zipcar, CCS). He favors consistency in the application of parking policies in city garages and for standardized parking in private garages. In addition, the general manager favors developing guidelines that clarify the difference between carsharing and car renting.⁵⁰

VI. IMPLICATIONS OF CURRENT TRENDS IN CARSHARING

The data above suggests that in many parts of the San Francisco Bay Area, especially in the higher-density core cities of San Francisco, Oakland, and Berkeley, there has been a clear move toward greater provision of carsharing. As yet another alternative to car use and ownership, carsharing has allowed San Francisco and several other cities in the region to adopt policies that encourage less parking in new development.

Based on the data acquired, carsharing has proven to be quite successful in San Francisco, with significant increases in the number of carsharing members in the city. Developers seem to have come to grips with the notion that they are now expected to provide a specific number of carsharing spaces in their buildings. Many cities have either made carsharing a requirement (as a condition of building approval) or strongly promote it as another demand management tool used to reduce long-term car ownership and use.

Another apparent advantage of on-site carsharing is that it not only makes this alternative more convenient to building residents, but it also provides additional vehicles to existing members, with new locations that may be closer to their residence. In addition, although carsharing providers are careful to keep on-site spaces open to all members, on-site residential carsharing gives these organizations the opportunity to tap into a new market of potential members as residents move into the building.

Despite these important advances, there remain a series of obstacles and issues that prevent the region from expanding carsharing services even further. While carsharing has expanded in San Francisco, it is still catching on in Berkeley and Oakland, where fewer new residential projects are being built and where city governments have only recently considered implementing carsharing requirements.

One inherent obstacle is the relatively low density of residential development in most of the Bay Area. The vast majority of cities in the region are well below the threshold density of 8.5 residential units per acre above which 75 percent of all carsharing neighborhoods lie.⁵¹ In business terms, there is no market for carsharing services in low-density communities at the price for which it can be sustained. While San Francisco, Berkeley, and even San José may be able to establish varying levels of interest in carsharing, most suburban communities, especially those with limited transit, are not in a position to accommodate carsharing from a density standpoint. Perhaps traditional carsharing will be limited to the region's inner cities; however, it should be noted that innovative alternatives, such as peer-to-peer carsharing, may be more appropriate for moderate-density markets.

Many financial institutions, particularly in San Francisco, appear to finally be buying into the idea of financing developments that offer less parking and provide exclusive carsharing spaces in their garages. It is not clear, however, that stakeholders have cleared this hurdle in the new suburban developments that are proposing to introduce carsharing along transit corridors (e.g., San Mateo).

Another concern that persists is the issue of security in buildings where carsharing services are provided. While many building developers and owners seem to have resolved the issue through the physical separation of carsharing spaces from the rest of the garage parking, many residents remain concerned that carsharing will result in breaches in building security.

Finally, one future obstacle may be the unwillingness of some suburban planners, developers, and officials to advocate lower parking requirements in new development, even near transit. Many low- to medium-density cities may not wish to change these requirements if they cannot be assured that potential buyers and renters will indeed use transit and forego owning a vehicle; they also want assurance that carsharing providers will commit to sustained services in these areas.

VII. CONCLUSIONS AND RECOMMENDATIONS

An increasing number of localities throughout the United States have concluded that one way to reduce the adverse impacts of the private vehicle is to implement trip reduction strategies that reduce vehicle miles driven and, where possible, discourage car ownership. One way to achieve these objectives is to promote carsharing in high-density areas, effectively postponing or even eliminating the need to own a car.

This study explored the growth of carsharing in the United States, primarily in the San Francisco Bay Area, tracing its emergence as a reliable alternative to car ownership. Carsharing organizations offer their paying members the possibility of depending on transit and other alternative modes for most daily trips, while recognizing the occasional need to use an auto. This study delved into the mechanics of carsharing, uncovering the steps taken by the principal stakeholders to ensure that acceptable service is provided.

Findings from the survey data suggest that in the past ten years, carsharing has begun to play a very important role in the region, just as the reduction of parking provision has in some areas. However, while San Francisco has solidified its position as the primary center of carsharing in the region, there still are a number of issues to resolve, especially in suburban communities that have only recently begun to discuss carsharing.

In this sense, San Francisco has successfully marketed carsharing to an important sector of the population, expanding its scope and base in the city. Nevertheless, most suburban communities in the Bay Area have really only begun to hear about the benefits of carsharing and are still somewhat hesitant to introduce it, even along transit corridors. Developers and residents must first be convinced of its opportunities and informed of its limitations before carsharing can be widely accepted.

Despite the growth of carsharing, key issues surrounding the provision and management of these services in San Francisco still remain, including the following:

- Access to carsharing outside of the downtown: More recently, providers have increasingly sought markets in lower-density areas of the city.
- Rise of alternative carsharing (e.g., peer-to-peer services): Established providers are faced with the need to refocus their services in light of such competition.
- City promotion of carsharing: It is not yet clear what role the City will play in expanding carsharing as an alternative to vehicle ownership.
- Incorporation of carsharing among alternative modes: An integrated transport system should include all forms of transportation (i.e., carsharing should be an additional travel option, along with transit, bicycling, and walking).

One recommendation for informing planners and developers of the opportunities provided by carsharing is to develop several carsharing models. One model could cater to a large city with high density (e.g., San Francisco), where opportunities for traditional carsharing abound. Another model could be designed for moderate-density suburban communities (e.g., with densities of 7 to 10 residential units per acre), through the deployment of traditional as well as alternative carsharing strategies (e.g., peer-to-peer carsharing). In these areas, trip reduction might be achieved through the integration of carsharing with other alternative modes of transportation, such as transit or bicycles. For traditional carsharing services to be successful in suburban communities, it may be important that these areas are not only of moderate-to-high density, but that they are located near transit facilities, have access to regular transit service, and that local residents are open to trying alternative modes on a regular basis.

Nevertheless, it is important to note that the reliable provision of transit — an essential element for carsharing to be successful — is often controlled by transit agencies that have limited interaction with developers and planners. Thus, it will be important for developers, planners, and residents to collectively reach out to transit agencies and other transportation agencies to ensure that they are aware of the benefits of carsharing. In addition, transportation agencies need to commit to reducing parking requirements and promoting transit, bicycling, and walking as alternatives to the car.

APPENDIX A: SAN FRANCISCO GENERAL PLAN OBJECTIVES/POLICIES

Housing Element (Adopted in 2009)

Policy 12.1: Encourage new housing that relies on transit use and environmentally sustainable patterns of movement.

In addition to improving transit reliability, this policy encourages broadening access to carsharing options.

Transportation Element (Adopted in 1995, with subsequent amendments)

Policy 1.3: Give priority to public transit and other alternatives to the private automobile as the means of meeting San Francisco's transportation needs, particularly those of commuters.

This 1995 element was written prior to the introduction of carsharing, so no specific reference to carsharing is made. Future revisions could potentially include it as an alternative mode.

Eastern Neighborhoods Area Plan (Adopted in 2008)

Objective 4.8: Encourage alternatives to car ownership and the reduction of private vehicle trips.

Policy 4.8.1: Continue to require carsharing arrangements in new residential and commercial developments, as well as any new parking garages.

These area plan components identify carsharing and transportation demand management (TDM) programs as important tools to reduce congestion and limit parking demand in the areas listed above.

Market and Octavia Area Plan (Adopted in 2007)

Policy 2.4.1: Disaggregate the cost of parking from the cost of housing.

This policy recommends encouraging private developers to partner with carsharing programs in locating carshare parking in new buildings.

Policy 5.4.7: Support innovative mechanisms for local residents and businesses to share automobiles.

This policy identifies the role of carsharing programs in enabling local residents to use a car without the need to own one; it also highlights the importance of providing carsharing

facilities at convenient, visible locations in the plan area. Specific recommendations include:

- Exempting parking spaces dedicated to carsharing from parking maximums and parking impact fees throughout the area
- Identifying on-street parking spaces with high visibility for use by certified carsharing providers and working with the SFMTA to arrange for spaces to be dedicated on an annual basis
- Providing guidelines for the location, signage, and marketing of off-street carsharing facilities to project sponsors who wish to include carsharing in their development

Rincon Hill Area Plan (Adopted in 1995, with subsequent amendments)

Policy 5.15: Require new residential development of over 50 units to offer at least one parking space to a carsharing organization for the right of first refusal.

This policy sets a standard threshold for the provision of carsharing spaces in new development.

Balboa Park Area Plan (Adopted in 2008)

Policy 3.2.3: Promote carsharing programs as an important way to reduce parking needs while still providing residents with access to an automobile when needed.

This policy supports carsharing programs in the plan area to minimize the negative impacts of new development on parking availability.

Policy 3.5.2: Prioritize on-street parking in the Transit Sta. Neighborhood for particular types of users.

This prioritizes curb space for carsharing services, along with other modes.

Executive Park Subarea Plan (Adopted in 2011)

Policy 5.1: Provide a range of transportation opportunities to the residents of Executive Park.

This policy recommends that the Executive Park Transportation Management Program facilitates carsharing.

APPENDIX B: SAN FRANCISCO PLANNING CODE REGULATIONS

Section 151.1. Schedule of Permitted Off-Street Parking Spaces in Specified Districts

151.1(d): Car-Share Parking. Any off-street parking space dedicated for use as a car-share parking space, as defined in Section 166, shall not be credited toward the total parking permitted as accessory.

151.1(e)(2): In granting approval for accessory parking in Downtown Residential Districts (DTR)...the Commission may require that the owner pay the membership fee to a certified car-share provider...for any project resident who requests and qualifies for membership, when the following findings are made by the Commission: (A) the project encourages additional private-auto use; and (B) localized transportation impacts may be lessened for the neighborhood by the provision of car-share memberships to residents.

151.1(f)(2): In granting approval for accessory parking in Commercial (C-3) Districts, the Commission may require that the property owner pay the annual membership fee to a certified car-share organization...for any resident of the project who so requests and otherwise qualifies for membership, provided that such requirement is limited to one membership per dwelling unit.

151.1(g)(1)(i): Under parking for non-residential uses, projects that provide more than 10 spaces for non-residential uses must dedicate five percent of these spaces, rounded down to the nearest whole number, to short-term, transient use by vehicles from certified carsharing organizations.

151.1(g)(2): In granting approval for accessory parking above that permitted by right, the Commission may require the property owner to pay the annual membership fee to a certified car-share organization for any resident of the project who so requests and who otherwise qualifies for such membership, provided that such requirement shall be limited to one membership per dwelling unit.

Section 157. Conditional Use Applications for Parking Exceeding Accessory Amounts

157(b): In considering an application for a conditional use for parking, where the amount of parking provided exceeds the amount classified as accessory parking, the Planning Commission shall look for demonstration that the apparent demand for additional parking cannot be satisfied by the applicant's provision of one or more car-share parking spaces in addition to those already required by this Code.

157(e)(5): Such a facility shall provide spaces for carsharing vehicles per Section 166 of the Code.

Section 158.1. Non-Accessory Parking Garages in NCT and RTO Districts and the Van Ness and Market Downtown Residential Special Use District

158.1(b)(6): Non-accessory parking facilities in NCT and RTO Districts and in the Van Ness/Market Downtown Residential Special Use District shall meet the following criteria and conditions: facility shall dedicate no less than five percent of its spaces for short-term, transient use by carsharing vehicles.

158.1(e)(2): Review of any new publicly-owned non-accessory parking facilities or expansion of publicly-owned parking facilities in Neighborhood Commercial Transit (NCT), Residential Transit-Oriented Neighborhood (RTO) and the Van Ness and Market Downtown Residential Special Use Districts shall also ensure that all major institutions and employers have TDM programs to encourage carsharing.

Section 163. Transportation Management Programs and Transportation Brokerage Services in C-3, Eastern Neighborhoods Mixed Use and South of Market Mixed-Use Districts

163(b)(4): Promote and encourage the provision of carsharing services convenient to tenants and employees of the subject buildings...and promote and encourage tenants and their employees to prioritize the use of car-share services for activities that necessitate auto travel, including the promotion and sale of individual and business memberships in certified carsharing organizations.

Section 166. Carsharing

166(a): This subsection recognizes the role of carsharing in mitigating the negative impacts of new development by reducing the rate of individual car ownership per household, the average number of miles driven per household and the total amount of auto-generated pollution per household.

166(b): This subsection defines a number of terms, including a car-share service, a certified car-share organization, an off-street car-share parking space, and a carshare vehicle.

166(c): Car-share spaces shall be generally permitted in the same manner as residential accessory parking. Any residential or commercial parking space may be voluntarily converted to a car-share space.

166(d)(1): Project sponsors are required to provide one carshare parking space for 50 to 200-unit residential buildings, and one more for each additional 200 units. For Non-Residential Uses or in a Non-Accessory Parking Facility, sponsors are required to provide one carshare parking space for 25-49-space facilities and one more space for each additional 50 spaces.

166(d)(2): Car-share spaces are to be made available, at no cost, to a certified car-share organization for purposes of providing car-share services for its car-share service subscribers. The car-share spaces may be provided (i) on the building site, (ii) on another off-street site within 800 feet of the building site.

166(d)(3): If car-share spaces are located on the building site or an off-street site: (A) Car-share spaces must be made accessible to residents and non-resident subscribers; (B) A Notice of Special Restriction (NSR) on the property must identify the minimum number and location of required car-share parking; (C) Required car-share spaces shall be constructed/ provided at no cost; and (D) Spaces may be used by non-car-share vehicles as long as no certified car-share organization can make use of the dedicated space(s).

166(e): Provision of a required car-share parking space shall satisfy or may substitute for any required residential parking; however, such space shall not be counted against the maximum number of parking spaces allowed by this Code as a principal use, an accessory use, or a conditional use.

166(f): The Planning Department maintains a publicly-accessible list of all projects approved with required off-street car-share parking spaces. The list contains Assessor's information, number of required off-street car-share parking spaces, project sponsor/owner contact information and other information.

APPENDIX C: LIST OF BAY AREA DEVELOPMENTS WITH ON-SITE CARSHARING (2011)

Property Address	City	Number of Residential Units	Number of Carsharing Spaces	Carshare Provider	Notes	Status
177 Townsend St	SF		3			Built
300 Spear St	SF	806	3			Built
301 Mission St	SF	320—440	4			Built
270 Valencia St	SF	28	2			Built
1 Hawthorne St	SF	135	0		Not set up in building yet, currently across the street	Built
1160 Mission St	SF	250	4	City	City CarShare promoted on property website	Built
631 Folsom St	SF	120	2	City	Only 47 off-street spaces according to SF Planning?	Built
40-50 Lansing	SF	82	1		80 parking spaces (1:1)	Built
724 Van Ness Ave	SF	130	2	City	Promoted on property website	Built
888 7th St	SF	224	4			Built
1275 Fell St	SF		2			Built
425 First St	SF		4	Zip & City	2 City CarShare and 2 Zipcar (per request of residents)	Built
1169 Market St	SF					Built

Property Address	City	Number of Residential Units	Number of Carsharing Spaces	Carshare Provider	Notes	Status
1045 Mission St	SF	278	2	City	Unbundled parking, in partnership with SF Redevelopment	Built
766 Harrison St	SF	98	1	City	Unbundled parking, only 5 spaces, plus 1 for City CarShare	Built
1180 Howard St	SF	74	1	City	Unbundled parking, City CarShare space open to public	Built
410 & 418 Jessie St	SF	52 & 25	1	City	City CarShare space is on a mechanical lift parking system	Built
225 King St	SF		3	Zip		Built
1390 Mission St	SF	136	1	City		Built
75 Dore St	SF	98	1	City		Built
810 Battery	SF	81			Carsharing at 825 Front Street	Built
2949 18th St	SF	151		City	Carsharing pod address is 671 Alabama Street	Built
355 Berry St	SF	194				Built
300 Berry St	SF					Built
330 Berry St	SF	131			Mission Walk	Built
1201 4th St	SF	191			Strata, surveyed in this research	Built

Property Address	City	Number of Residential Units	Number of Carsharing Spaces	Carshare Provider	Notes	Status
680 Illinois St	SF	39				Built
1844 Market St	SF	113	4		Only 90 parking spaces (In Market/Octavia Planning Area)	Unbuilt
375–399 Fremont St	SF					Unbuilt
45 Lansing St	SF					Unbuilt
340 Fremont St	SF					Unbuilt
570 Jessie St	SF					Unbuilt
474 Natoma St	SF	55			BMR	Unbuilt
900 Folsom St	SF	448			323 parking spaces	Unbuilt
1 Capital Ave	SF	28				Unbuilt
1080 Sutter St	SF	35	2			Unbuilt
1960–1998 Market St	SF					Unbuilt
430 Main St	SF	80				Unbuilt
1946 Polk St	SF	43	2		Car lifts proposed for garage/parking reduction	Unbuilt
345 6th St	SF					Unbuilt

Property Address	City	Number of Residential Units	Number of Carsharing Spaces	Carshare Provider	Notes	Status
2235 3rd St	SF	196		City	128 parking spaces proposed, City CarShare spaces on plans	Unbuilt
333 Fremont St	SF	82	3			Unbuilt
299 Valencia St	SF				0.75 spaces/DU, > 0.5 spaces/DU in Market Octavia Plan	Unbuilt
1150 Ocean Ave	SF		3		3 spaces are required, 5 spaces are provided	Unbuilt
25 Lusk St	SF		1			Unbuilt
1036 Mission St	SF				100% Affordable project	Unbuilt
555 Washington St	SF	248				Unbuilt
235 Broadway	SF					Unbuilt
1700 S. Delaware St			12		12 carsharing spaces on site	Approved
2020 Kittredge St	BK		1		Student housing	Built
2175 Kittredge St	BK				Oxford Plaza, surveyed in this research	Built
2116 Allston Way	BK		1		Student housing	Built
200 Second St	OK	70	1	City		Built
500 William St				Zip	Zipcar on site, with free membership to residents	Built

Note: SF=San Francisco; BK=Berkeley; OK=Oakland; City=City CarShare; Zip=Zipcar.

APPENDIX D: DEVELOPER SURVEY INSTRUMENT

Basic Information (for one or more of your projects)

1. General information

- Address, units, type, year of completion
- Tenant characteristics: household size, age, education, occupation, etc.
- Price range

2. Parking information

- Number of carsharing spaces
- Number of other spaces
- Parking cost (\$/month)

3. In your opinion, what is the role of parking in residential developments?

4. In general, how do you view government regulation of residential parking with regard to:

- Minimum requirements?
- Maximum requirements?
- Unbundling of parking?
- Carsharing requirements (if any)?

5. What is your experience with providing carsharing in residential development projects?

- How many of your projects have included carsharing?
- Are they successful?
- When was the first project implemented?
- If you could re-do the project, would you provide carsharing? What changes would you make?

6. In your opinion, do you think that on-site carsharing services work better for some types of residential projects than others (e.g., size, type, price range, tenants, and location of projects)? If Yes, please explain.

7. Within your development circle, how do others view the provision of on-site carsharing?

8. When you started this project, what regulations had been placed on residential parking?

- Minimum, maximum, unbundled parking, etc.?
- Regulations specific to on-site carsharing (mandatory, incentives, etc.)

9. If there are incentives coming from local government, could you please describe them in detail?

10. Why do you choose to provide on-site carsharing (if you have other options)?
11. In your opinion, what are the advantages of having on-site carsharing in a residential project?
12. In your opinion, what are the disadvantages of having on-site carsharing in a residential project?
13. What are the costs and/or benefits of supplying on-site carsharing parking?
 - Capital construction cost (number of spaces, insulation cost, etc.)
 - Operating cost (developer, carsharing provider, etc.)
 - Opportunity cost (more housing units, commercial space, etc.)
 - Others (liability, access, etc.)
14. Do you feel that granting access to non-residents (outside carsharing users) would be a problem? Why or why not?
15. In your opinion, how do banks/financial institutions view on-site carsharing?
16. In your opinion, how do people in the surrounding neighborhood view carsharing? Any complaints?
17. Who are the current, on-site providers of carsharing?
 - One vs. multiple providers
 - If there are multiple providers, how does each provider view the involvement of the other (if you know)?
18. Please describe the process, from conception of the idea to signing a contract with the providers.
 - Who approached whom?
 - What was the response from the other side?
 - Was there a third party involved in the process (e.g., local government)?
 - If there are multiple providers, was the negotiation process more difficult?

-
19. Could you tell us a bit more about the contract?
- How long the contract will last
 - Any penalty when one party decides to withdraw?
 - Other
20. Are there any cost/benefit sharing mechanisms established between the developer, property managing company, homeowners association (if any), and the carsharing provider?
- Developer provides subsidy to carsharing provider
 - Residents get discount from carsharing provider
 - Carsharing provider is responsible for maintaining carsharing parking spaces
 - Others
21. Are the carsharing parking spaces physically separate from other spaces?
22. Is it possible for the developer/managing company to make carsharing service only available to residents?
23. Do you think that cooperation between developer, service provider, and government could be further improved? If the answer is Yes, how could it be improved?
24. In your opinion, do you believe that there is sufficient demand to support the provision of on-site carsharing (in your projects and in general)?
25. Could you list some examples of renter/buyer response to on-site carsharing services during the sales process (e.g., positive, negative, indifferent)?
26. In your observation, are the carsharing vehicles well utilized?
- By residents?
 - By non-residents?
27. Why provide carsharing on this site instead of using services outside the building?
- Any nearby carsharing spots?
28. Do you provide free carsharing membership to tenants/residents?

29. In your opinion, how would on-site carsharing affect tenant decisions with respect to car ownership?
30. How are other parking spaces allocated?
- Bundled with housing?
 - Available to non-residents?
 - Others
31. Are these parking spaces often fully occupied by residents?
32. Do you have any recommendations to local government regarding the provision of on-site carsharing in residential projects?
33. Would you be interested in further discussing your thoughts concerning carsharing?

APPENDIX E: PROVIDER SURVEY INSTRUMENT

Basic Information (for your projects)

1. General information
 - Location of project sites with on-site carsharing
 - Tenant characteristics: household size, age, education, occupation, etc.
 - Price range
2. Parking information
 - Number of carsharing spaces per project (range)
 - Number of other parking spaces (range)
3. What is your experience with providing carsharing to a residential development?
 - Have they been successful?
 - When did your company implement its first residential project and where?
 - If you could re-do a project, what changes would you suggest?
4. In your opinion, do you think that on-site carsharing services work better for some types of residential projects rather than others (e.g., size, type, price range, tenants, location)?
If Yes, please explain.
5. Where your company has provided on-site service, what sorts of carsharing requirements have been placed on developers (mandatory, incentives, etc.)?
6. What sorts of incentives (if any) have come from local government?
7. In your opinion, what are the advantages of providing on-site carsharing in a residential project?
8. In your opinion, what are the disadvantages of providing on-site carsharing in a residential project?
9. What are the typical costs and/or benefits of supplying on-site carsharing parking?
 - Capital construction cost (number of spaces, insulation cost, etc.)
 - Operating cost (developer, carsharing provider, etc.)
 - Opportunity cost (more housing units, commercial space, etc.)
 - Others (liability, access, etc.)

10. In your experience, has granting access to non-residents (outside carsharing users) been a problem?
11. In your opinion, how have surrounding residents reacted to on-site carsharing? Any complaints?
12. Please provide some detail on the contracting process between your company and a developer.
 - Who approaches whom?
 - Is there typically a third party involved in the process (e.g., local government)?
 - Is the negotiation process more difficult in areas where there are other carsharing providers?
13. Could you tell us a bit more about the carsharing contracts signed with developers?
 - How long do the contracts normally last?
 - Any penalty when one party decides to withdraw?
 - Other
14. What cost/benefit sharing mechanisms are typically established between developer and provider?
 - Developer provides subsidy to carsharing provider
 - Residents get discount from carsharing provider
 - Carsharing provider is responsible for maintaining the carsharing parking spaces
 - Others
15. Could cooperation between developer, service provider, and government be improved? If yes, how?
16. In your opinion, where is there sufficient demand to support the provision of on-site carsharing?
17. In your observation, are carsharing vehicles at on-site residential locations well utilized?
 - By residents?
 - By non-residents?
18. Why do some developers provide on-site carsharing rather than use services outside the building?

19. In your opinion, how does on-site carsharing affect tenant decisions with respect to car ownership?
20. Are these on-site residential parking spaces often fully occupied by building residents?
21. Do you have suggestions for local government regarding on-site carsharing in residential projects?
22. Do you know of residential developers in San Francisco that we could contact for an interview?
23. Would you be interested in further discussing your thoughts concerning carsharing?

ENDNOTES

1. World Health Organization (WHO), *Transport (Road Transport): Shared Interests in Sustainable Outcomes*, Social Determinants of Health, Sectoral Briefings Series 3 (Geneva, Switzerland: WHO, 2011), http://whqlibdoc.who.int/publications/2011/9789241502580_eng.pdf (accessed March 28, 2012).
2. Todd Litman, "Measuring Transportation: Traffic, Mobility and Accessibility," *ITE Journal* 73 (October 2003): 28–32.
3. See Susan Shaheen and Adam Cohen, "Growth in Worldwide Carsharing: An International Comparison," *Transportation Research Record* 1992 (2007): 81–89; Donald Shoup, *The High Cost of Free Parking* (Chicago, IL: American Planning Association, 2004).
4. Shoup, *The High Cost of Free Parking*.
5. Shaheen and Cohen, "Growth in Worldwide Carsharing."
6. Ibid.
7. This definition of TDM is adapted from the following sources: Victoria Transport Policy Institute, "TDM Encyclopedia. About This Encyclopedia: What is Transportation Demand Management?" February 17, 2010, <http://www.vtpi.org/tdm/tdm12.htm> (accessed December 1, 2011); Transportation Research Board, "Transportation Research Thesaurus," 2012, <http://trt.trb.org/trt.asp?> (accessed March 4, 2012).
8. Susan Shaheen, Adam Cohen, and Melissa Chung, "North American Carsharing," *Transportation Research Record* 2110 (2009): 35–44.
9. Michael D. Meyer, "Demand Management as an Element of Transportation Policy: Using Carrots and Sticks to Influence Travel Behaviour," *Transportation Research Part A* 33 (1999): 575–599.
10. Charles Rivasplata and María Alejandra Guilarte, "The Implementation of Mobility Management: A Comparison of Recent Strategies in Latin America and the United States" (paper presented at the CODATU XII Conference, Lyon, France, July 5–7, 2006).
11. Colin Black and Eric Schreffler, "Understanding Transport Demand Management and Its Role in Delivery of Sustainable Urban Transport," *Transportation Research Record* 2163 (2010): 81–88.
12. IBI Group, *Parking Standards Review: Examination of Potential Options and Impacts of Car Share Programs on Parking Standards, Final Report* (Toronto, Canada: IBI Group, 2009), http://www.toronto.ca/zoning/pdf/car_share_2009-04-02.pdf (accessed May 2012).

13. Elliot Martin and Susan Shaheen, *Greenhouse Gas Emission Impacts of Carsharing in North America*, MTI Report 09-11 (San José, CA: Mineta Transportation Institute, June 2010).
14. Susan Shaheen, Adam Cohen, and Elliot Martin, "Carsharing Parking Policy: A Review of North American Practices and San Francisco Bay Area Case Study," *Transportation Research Record* 2187 (2010): 146–156.
15. Shaheen, Cohen, and Chung, "North American Carsharing."
16. Shaheen and Cohen, "Growth in Worldwide Carsharing."
17. Shaheen, Cohen, and Martin, "Carsharing Parking Policy."
18. Todd Litman, *Parking Management Best Practices* (Chicago, IL: American Planning Association, 2006).
19. City of Seattle, *Municipal Code*, SMC 23.54.020, Parking quantity exceptions (Section J. Parking for City-recognized Car-sharing Programs), <http://clerk.ci.seattle.wa.us/~scripts/nph-brs.exe?s1=&s2=Parking+quantity+exceptions&S3=&Sect4=AND&I=20&Sect3=PLURON&Sect5=CODE1&d=CODE&p=1&u=%2F~public%2Fcode1.htm&r=10&Sect6=HITOFF&f=G> (accessed May 2012).
20. City of Vancouver, *Parking By-Law*, Section 3.2, May 2006, <http://vancouver.ca/commsvcs/Bylaws/parking/sec03.pdf> (accessed May 2, 2012).
21. IBI Group, *Parking Standards Review*.
22. Ibid.
23. Ibid.
24. Robert Cervero and Yuhsin Tsai, "San Francisco City CarShare: Assessment of Trends and Second-Year Travel Behavior Impacts" (Working Paper 2003-05, Institute of Urban and Regional Development, University of California, Berkeley, 2003).
25. Susan Shaheen, Caroline Rodier, Gail Murray, Adam Cohen, and Elliot Martin, *Carsharing and Public Parking Policies: Assessing Benefits, Costs, and Best Practices in North America*, MTI Report 09-09 (San José, CA: Mineta Transportation Institute, March 2010).
26. Shaheen, Cohen, and Martin, "Carsharing Parking Policy."
27. Zipcar, "Choose an Existing Organization or Company," http://www.zipcar.com/join/company-search-2?account_name=University&of&California,&Davis (accessed March 30, 2012).

-
28. Alyssa Sherman, "The Effects of Residential Off-Street Parking Availability on Travel Behavior in San Francisco" (master's thesis, San José State University, May 2010).
 29. Shaheen, Cohen, and Martin, "Carsharing Parking Policy."
 30. Marcus Enoch, "Supporting Car Share Clubs: A Worldwide Review" (paper presented at the Third Meeting of the Mobility Services for Urban Sustainability Project, London, February 2002).
 31. City of San Francisco Planning Department, *Planning Code*, 2012, [http://www.amlegal.com/nxt/gateway.dll/California/planning/planningcode?f=templates\\$fn=default.htm\\$3.0\\$vid=amlegal:sanfrancisco_ca\\$sync=1](http://www.amlegal.com/nxt/gateway.dll/California/planning/planningcode?f=templates$fn=default.htm$3.0$vid=amlegal:sanfrancisco_ca$sync=1) (accessed March 15, 2012).
 32. City of San Francisco Planning Department, *Planning Code*, Section 166 (in Appendix B).
 33. Many of these garages are located in the newly developed Mission Bay area, just south of downtown.
 34. City of San Francisco Planning Department, *General Plan*, March 2012, http://www.sf-planning.org/ftp/general_plan/index.htm (accessed March 15, 2012).
 35. City of San Francisco Planning Department, *Planning Code*.
 36. See City of San José, "Council to Approve Request for Car Share Program in San Jose," News Release, March 22, 2011; and Austin Walsh, "Bike and Car Share Programs Coming to Peninsula," *San Mateo Patch*, August 10, 2011, <http://menlopark.patch.com/articles/bike-and-car-share-programs-coming-to-peninsula> (accessed March 29, 2012).
 37. For example, the Capitol Avenue project is located more than six miles southwest of downtown, near the Balboa Park BART Station.
 38. That is to say, the carsharing spaces provided are in addition to the cap.
 39. City of San Francisco Planning Department, *Planning Code*, Section 166 (in Appendix B).
 40. City of San Francisco Planning Department, *Planning Code*, Section 167.
 41. Outside of the greater downtown, where transit is reliable and densities are fairly high, many providers have often been hesitant to provide carsharing services.
 42. Some planners remarked that they were unable to provide data on carsharing members because some providers refused to release this information to the public.
 43. Rick Hutchinson (Chief Executive Officer, City CarShare), interview by Charles Rivasplata, February 7, 2012.

44. City CarShare, *Getting More with Less: Managing Residential Parking in Urban Developments with Carsharing and Unbundling* (San Francisco, CA: City CarShare and Nelson Nygaard, December 2011).
45. Michael Uribe (General Manager, Zipcar San Francisco), interview by Charles Rivasplata, May 22, 2012.
46. Ibid.
47. Ibid.
48. Rick Hutchinson, interview by Charles Rivasplata.
49. Ibid.
50. Michael Uribe, interview by Charles Rivasplata.
51. Christine Celsor and Adam Millard-Ball, "Where Does Carsharing Work?" *Transportation Research Record* 1992 (2007): 61–69.

BIBLIOGRAPHY

- Black, Colin, and Eric Schreffler. "Understanding Transport Demand Management and Its Role in Delivery of Sustainable Urban Transport." *Transportation Research Record* 2163 (2010): 81–88.
- Celsor, Christine, and Adam Millard-Ball. "Where Does Carsharing Work?" *Transportation Research Record* 1992 (2007): 61–69.
- Cervero, Robert, and Yuhsin Tsai. "San Francisco City CarShare: Assessment of Trends and Second-Year Travel Behavior Impacts." Working Paper 2003-05, Institute of Urban and Regional Development, University of California, Berkeley, 2003.
- City CarShare. *Getting More with Less: Managing Residential Parking in Urban Developments with Carsharing and Unbundling*. San Francisco, CA: City CarShare and Nelson Nygaard, December 2011.
- City of San Francisco. "Transit First Policy." *San Francisco City Charter*, Section 8A.115. San Francisco: San Francisco Legal Code, 1999.
- City of San Francisco Planning Department. "Car-Share Requirements and Guidelines." September 28, 2011. <http://www.sf-planning.org/index.aspx?page=2347> (accessed March 15, 2012).
- . *General Plan*. March 2012. http://www.sf-planning.org/ftp/general_plan/index.htm (accessed March 15, 2012).
- . *Planning Code*. 2012. [http://www.amlegal.com/nxt/gateway.dll/California/planning/planningcode?f=templates\\$fn=default.htm\\$3.0\\$vid=amlegal:sanfrancisco_ca\\$sync=1](http://www.amlegal.com/nxt/gateway.dll/California/planning/planningcode?f=templates$fn=default.htm$3.0$vid=amlegal:sanfrancisco_ca$sync=1) (accessed March 15, 2012).
- City of San Francisco Redevelopment Agency (SFRA). *Candlestick Point and Hunters Point Shipyard Phase II Development Plan*. Chapter 4 (Project Definition). San Francisco, CA: SFRA, 2011.
- City of San José. "Council to Approve Request for Car Share Program in San Jose." News Release. March 22, 2011.
- City of Seattle. *Municipal Code*. SMC 23.54.020, Parking quantity exceptions (Section J. Parking for City-recognized Car-sharing Programs). <http://clerk.ci.seattle.wa.us/~scripts/nph-brs.exe?s1=&s2=Parking+quantity+exceptions&S3=&Sect4=AND&l=20&Sect3=PLURON&Sect5=CODE1&d=CODE&p=1&u=%2F~public%2Fcode1.htm&r=10&Sect6=HITOFF&f=G> (accessed May 2012).
- City of Vancouver. *Parking By-Law*. Section 3.2. May 2006. <http://vancouver.ca/commssvcs/Bylaws/parking/sec03.pdf> (accessed May 2, 2012).

- Enoch, Marcus. "Supporting Car Share Clubs: A Worldwide Review." Presented at the Third Meeting of the Mobility Services for Urban Sustainability Project. London, February 2002.
- IBI Group. *Parking Standards Review: Examination of Potential Options and Impacts of Car Share Programs on Parking Standards, Final Report*. Toronto, Canada: IBI Group, 2009. http://www.toronto.ca/zoning/pdf/car_share_2009-04-02.pdf (accessed May 2012).
- Litman, Todd. "Measuring Transportation: Traffic, Mobility and Accessibility." *ITE Journal* 73 (October 2003): 28–32.
- . *Parking Management Best Practices*. Chicago, IL: American Planning Association, 2006.
- Martin, Elliot, and Susan Shaheen. *Greenhouse Gas Emission Impacts of Carsharing in North America*. MTI Report 09-11. San José, CA: Mineta Transportation Institute, June 2010.
- Meyer, Michael D. "Demand Management as an Element of Transportation Policy: Using Carrots and Sticks to Influence Travel Behaviour." *Transportation Research Part A* 33 (1999): 575–599.
- Rivasplata, Charles, and María Alejandra Guilarte. "The Implementation of Mobility Management: A Comparison of Recent Strategies in Latin America and the United States." Paper presented at the CODATU XII Conference, Lyon, France, July 5–7, 2006.
- Shaheen, Susan. "Carsharing: A Strategy for Reducing Carbon Footprint and Parking Policy Approaches." Presentation at the 2011 CCPA Conference, Oakland, CA, November 3, 2011.
- Shaheen, Susan, and Adam Cohen. "Growth in Worldwide Carsharing: An International Comparison." *Transportation Research Record* 1992 (2007): 81–89.
- Shaheen, Susan, Adam Cohen, and Melissa Chung. "North American Carsharing." *Transportation Research Record* 2110 (2009): 35–44.
- Shaheen, Susan, Adam Cohen, and Elliot Martin. "Carsharing Parking Policy: A Review of North American Practices and San Francisco Bay Area Case Study." *Transportation Research Record* 2187 (2010): 146–156.
- Shaheen, Susan, Caroline Rodier, Gail Murray, Adam Cohen, and Elliot Martin. *Carsharing and Public Parking Policies: Assessing Benefits, Costs, and Best Practices in North America*. MTI Report 09-09. San José, CA: Mineta Transportation Institute, March 2010.

- Sherman, Alyssa. "The Effects of Residential Off-Street Parking Availability on Travel Behavior in San Francisco." Master's thesis, San José State University, May 2010.
- Shoup, Donald. *The High Cost of Free Parking*. Chicago, IL: American Planning Association, 2004.
- Transportation Research Board. "Transportation Research Thesaurus." 2012. <http://trt.trb.org/trt.asp?> (accessed March 4, 2012).
- U.S. Census Bureau. "Population, Housing Units, Area, and Density: 2010 Census Summary File 1." 2010. http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=DEC_10_SF1_GCTPH1.CY07 (accessed February 17, 2012).
- Victoria Transport Policy Institute. "TDM Encyclopedia. About This Encyclopedia: What is Transportation Demand Management?" February 17, 2010. <http://www.vtpi.org/tdm/tdm12.htm> (accessed December 1, 2011).
- . "TDM Encyclopedia. Performance Evaluation: Practical Indicators for Evaluating Progress Toward Planning Objectives." September 1, 2011. <http://www.vtpi.org/tdm/tdm131.htm> (accessed May 1, 2012).
- . "TDM Encyclopedia. Regional and County Government Actions." January 26, 2010. <http://www.vtpi.org/tdm/tdm205.htm> (accessed May 4, 2012).
- Walsh, Austin. "Bike and Car Share Programs Coming to Peninsula." *San Mateo Patch*, August 10, 2011. <http://menlopark.patch.com/articles/bike-and-car-share-programs-coming-to-peninsula> (accessed March 29, 2012).
- World Health Organization (WHO). *Transport (Road Transport): Shared Interests in Sustainable Outcomes*. Social Determinants of Health, Sectoral Briefings Series 3. Geneva, Switzerland: WHO, 2011. http://whqlibdoc.who.int/publications/2011/9789241502580_eng.pdf (accessed March 28, 2012).
- Zipcar. "Choose an Existing Organization or Company." http://www.zipcar.com/join/company-search-2?account_name=University&of&California,&Davis (accessed March 30, 2012).

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