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**CARSHARING PARKING POLICY: A REVIEW OF NORTH  
AMERICAN PRACTICES AND SAN FRANCISCO BAY AREA  
CASE STUDY**

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## **CARSHARING PARKING POLICY: A REVIEW OF NORTH AMERICAN PRACTICES AND SAN FRANCISCO BAY AREA CASE STUDY**

### **ABSTRACT**

Carsharing provides users access to a shared vehicle fleet for short-term use throughout the day, reducing the need for private vehicles. The provision of on-street and public off-street parking dedicated to carsharing is an important policy area confronting public agencies. As of July 2009, approximately 377,600 individuals were carsharing members in North America in about 57 metropolitan areas. A total of 17 jurisdictions, one state (California), and eight public transit operators in North America have formal and informal carsharing parking policies, pilot projects, and proposed legislation. These are reviewed in this paper, along with a framework for carsharing parking policy that reflects three levels of governmental support.

In addition, the authors examine carsharing parking policies in three jurisdictions in the San Francisco Bay Area, which accounts for an estimated 50,000 carsharing members and 1,100 shared-use vehicles. Supporting this examination is an intercept survey on carsharing parking (n=425) conducted in the Bay Area. Results show that most people supported the conversion of some type of spaces for carsharing use, and 48% thought that carsharing organizations should compensate the city for on-street spaces. At the same time, converting most types of spaces was opposed by at least 20% of respondents. Neighborhood residents were generally more in favor of parking conversion for carsharing than people visiting the area for work or errands. Finally, a majority (61%) felt that non-profits should have priority over for-profit organizations for carsharing spaces and should pay less than for-profit organizations.

**KEY WORDS:** Carsharing, parking, on-street, off-street, shared vehicle, North America, policy, intercept survey, San Francisco Bay Area

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### **INTRODUCTION**

In recent years, public policy has increasingly focused upon improving vehicle fleet efficiency and reducing energy consumption and carbon emissions. Public agencies have aggressively pursued climate action planning and carbon reduction strategies. This has coincided with a number of recent policy proposals including “cap-and-trade” and a plan to implement enhanced corporate average fuel economy standards of 35.5 miles per gallon by 2016 (1,2).

Over the last decade, the transportation sector has been the largest end-use contributor of carbon dioxide (CO<sub>2</sub>) emissions (3). According to the Department of Energy, petrol-based transportation CO<sub>2</sub> emissions generally coincide with vehicle miles or kilometers traveled (VMT or VKT). Public policies that support the reduction of VMT/VKT are one way that public agencies can achieve carbon reduction goals. Short-term auto use or carsharing is one transportation strategy that local governments and public agencies can employ in their efforts towards reducing VMT/VKT and supporting carbon mitigation efforts. Some public agencies (local governments, public transit operators, and parking authorities) have allocated parking to carsharing organizations due to its transportation, environmental, land use, and social impacts (4). Eighteen studies from 1986 to 2009 have documented carsharing’s impacts in these four areas.

The concept of carsharing is simple: individuals and businesses gain access to private vehicle use without the expense and responsibilities of auto ownership. Carsharing members have access to a fleet of vehicles in a network of locations and typically pay per use. One major impact of carsharing on the transportation system is reduced vehicle ownership. According to nine North American studies, a carsharing vehicle reduces the need for 4.6 to 20 privately owned cars (4,5,7). Thirteen of these studies also document between 15 and 32% of carsharing participants selling a vehicle after joining a carsharing program, and 25 to 71% delaying or foregoing a vehicle purchase (4,5). Ten North American impact studies also indicate an average reduction in VMT/VKT of 44% among carsharing members after having joined carsharing (4,5). In addition to reduced vehicle ownership and VMT/VKT, carsharing is associated with lower greenhouse gases and CO<sub>2</sub> emissions, as members typically shift trips to public transit, bicycling, and walking. Many carsharing organizations also include lower-emission vehicles in their fleets, such as gasoline-electric hybrid and plug-in hybrid cars. Finally, carsharing demonstrates beneficial social impacts (e.g., increased mobility for lower-income segments). Recent North American studies (2009) have documented that carsharing results in an average net reduction of at least 0.58 tonnes CO<sub>2</sub>/yr/member and that each carsharing vehicle likely removes between 9 to 12 private cars off the road (6, 7).

Changing dynamics in the economy appear to be causing carsharing to gain popularity due to the cost savings associated with this service (8, 9, 10). In May 2009, United States (U.S.) and Canadian unemployment reached 9.4 and 8.4%, respectively (11, 12). Five of these impact studies suggest that carsharing can be more affordable than private vehicle ownership as it enables households to gain or maintain vehicle access without bearing the full ownership costs. Because carsharing is typically an all-inclusive pay-as-you-go service, many carsharing members driving less than 16,000 km annually report lower transportation expenses using carsharing than with private vehicle ownership. These member surveys indicate an estimated monthly savings ranging from \$154 to \$600 in the U.S. and a savings of \$392 to \$583 in Canada (4, 13, 14). Carsharing offers a pay-as-you go alternative for individuals and families who may not require daily auto access. Furthermore, municipalities and public agencies are employing carsharing to reduce fleet management costs (15, 16). In 2004, Berkeley, California and Philadelphia, Pennsylvania were the first local governments to replace their municipal fleets with carsharing, saving taxpayers an estimated \$400,000 and \$5 million, respectively (17, 18).

This paper has five main sections. First, the authors provide a methodological discussion of the approaches employed in this study. Next, a carsharing parking overview is presented. This includes a discussion of international and North American carsharing parking policies/approaches, as well as a suggested policy framework. Third, the authors present a San Francisco Bay Area case study, which highlights the policies and approaches of three jurisdictions: 1) San Francisco, 2) Berkeley, and 3) the Bay Area Rapid Transit (BART) District. Finally, the authors present a San Francisco Bay Area public perception survey on carsharing followed by a conclusion.

## **METHODOLOGICAL APPROACH**

From January to May 2008, the authors surveyed 28 North American carsharing operators about parking. Sixteen of 18 U.S. operators and all 13 Canadian operators participated (Zipcar counts as one service provider in each nation). Respondents provided quantitative data on parking metrics including the number and composition of on- and off-street parking spaces and qualitative data on how carsharing parking works in their service areas.

Additionally, the authors conducted 34 expert interviews with public officials and governmental agencies with experience in the development, implementation, and administration of carsharing parking policies in North America. Experts were interviewed from all local jurisdictions with existing carsharing parking policies, with the exception of Brookline (MA), Chicago (IL), and Salt Lake City (UT) in the U.S. and Duncan (BC), Montreal (QC), Toronto (ON), and Vancouver (BC) in Canada. The authors attempted interviews with these jurisdictions but did not receive a response. Carsharing organizations with current operations in these cities provided supplemental information on carsharing parking policies in these jurisdictions.

In September 2008, researchers also administered a public intercept survey at four locations in the San Francisco Bay Area to gain insights into perceptions and opinions regarding on- and off-street carsharing parking provision. A total of 425 clipboard surveys were collected in San Francisco, Oakland, and Berkeley.

Operator survey data, expert interviews, and intercept survey results were supplemented with a literature review. The authors draw upon these data to provide a review of carsharing parking policies in North America, as well as to develop the San Francisco Bay Area case study in this paper.

### **CARSHARING PARKING POLICY**

In this section, the authors provide an overview of carsharing parking policy based upon their literature review, expert interviews, and carsharing operator surveys. After a brief introduction to worldwide practices, the authors focus on North America, providing: 1) an overview of key carsharing parking policy elements, 2) a carsharing parking supply analysis, and 3) an overview of carsharing parking policies. Overall, the discussion is focused on the allocation of on-street and public off-street parking (e.g., municipal garages) for carsharing vehicles and how various jurisdictions approach it. Finally, the authors outline a framework for carsharing parking policy development.

While on-street carsharing parking is common in North America, it is not practiced in some countries, such as Japan, Singapore, Switzerland, Spain, and France. But overall, the majority of carsharing nations worldwide do have access to on-street parking. Indeed, carsharing operators in many European nations, Australia, and North America often have access to free and/or reduced cost parking that is frequently provided as a form of non-monetary support. Not surprisingly, supportive parking policies are considered integral to carsharing's success in many regions (19). Table 1 presents a synopsis of worldwide approaches to carsharing parking policy.

**TABLE 1 Overview Carsharing Parking Around the World**

|                      | <b>On-Street Parking</b> | <b>Cost</b>      | <b>Dedicated Parking Zones</b> | <b>Parking as Non-monetary Support</b> |
|----------------------|--------------------------|------------------|--------------------------------|--|
| <b>Asia</b>          |                          |                  |                                |  |
| Japan                | No                       |                  |                                | No                                     |
| Singapore            | No                       |                  |                                | No                                     |
| <b>Australia</b>     |                          |                  |                                |  |
| Australia            | Yes                      | Free             | Yes                            | Yes                                    |
| <b>Europe</b>        |                          |                  |                                |  |
| Austria              | Yes                      |                  | Yes                            | No                                     |
| Belgium              | Yes                      |                  | Yes                            | Yes                                    |
| France               | No                       |                  |                                | No                                     |
| Germany              | Yes                      | Free and Reduced |                                | Yes                                    |
| Italy                | Yes                      | Free             | Yes                            | Yes                                    |
| Netherlands          | Yes                      | Free and Reduced |                                | Yes                                    |
| Spain                | No                       |                  |                                |  |
| Sweden               | Yes                      | Free and Reduced |                                | Yes                                    |
| Switzerland          | No                       |                  |                                | Yes                                    |
| United Kingdom       | Yes                      | Free and Reduced | Yes                            | Yes                                    |
| <b>North America</b> |                          |                  |                                |  |
| Canada               | Yes                      | Free             |                                | Yes                                    |
| United States        | Yes                      | Free and Reduced | Yes                            | Yes                                    |

Source: Shaheen, S.A. and A.P. Cohen. Growth in Worldwide Carsharing: An International Comparison. Transportation Research Record: *Journal of the Transportation Research Board*, No. 1992, Transportation Research Board of the National Academies, Washington, D.C., 2007, pp. 81-89.

### **Key Parking Policy Elements**

Based upon the authors' literature review and expert interviews in North America, a number of agencies either have or are developing a combination of formal and informal carsharing parking policies. Many of these policies cover: 1) how carsharing is defined; 2) if and how carsharing parking should be allocated; 3) whether there should be a policy differentiation between for-profit and non-profit carsharing providers; 4) how to manage demand for parking among multiple carsharing operators; 5) determining the monetary value of parking spaces; and 6) how

to address administrative issues such as permits, street cleaning, parking enforcement, and carsharing vehicle signage.

Some municipal parking policies include: 1) provisions for on-street parking; 2) parking time limit exemptions; 3) creation of carsharing parking zones; 4) free or reduced cost parking spaces and/or parking permits; 5) universal parking permits (i.e., carsharing vehicles can be returned to any on-street location); and 6) formalized processes for assigning on-street parking spaces. Based on this research, the authors identified seven key elements among North American carsharing parking policies. They are summarized in Table 2 below.

**TABLE 2 Key Elements of North American Carsharing Parking Policies**

| <b>Parking Policy Element</b>          | <b>Description</b>   |
|--|--|
| Parking Allocation                     | <p>The allocation of carsharing parking is typically implemented through a combination of formal and informal processes. Some municipalities have established “option zones” that designate on-street carsharing parking. Other cities have allocated parking stalls for carsharing as a “vehicle-class” rather than dedicating parking spaces to specific carsharing operators. Other local agencies allocate parking through the use of parking permits, which allow “exclusive-use” of parking within a specific parking zone or district or the use of a particular parking spot.</p> <p><i>Formal Processes:</i> Formal processes include established policies that are either written, codified by local ordinances and zoning provisions, or negotiated through a formal request for proposal (RFP) process.</p> <p><i>Informal Processes:</i> An informal allocation process includes approving on-street and off-street carsharing parking through variances, special permits, and case-by-case approvals either from administrative staff or an elected council.</p> |
| Parking Caps                           | Caps limit the number or locations of on-street parking spaces used for carsharing. A public agency may limit the number of carsharing parking spaces in a category (e.g., on- or off-street), the number of parking spaces per operator, the number of parking spaces in a particular location, or parking stalls per given membership level (e.g., one parking stall per 100 members served).  |
| Fees and Permits                       | Some public agencies charge carsharing operators for parking to recover lost parking revenue from the conversion of parking from general-use to carsharing-only spaces. Methods for determining the amount an operator may be assessed for a parking space include: 1) residential parking permit cost; 2) foregone meter revenue; 3) cost of providing parking (e.g., operations, administrative costs, overhead, and maintenance); or 4) the market cost for private or public off-street parking in a given parking district or municipal jurisdiction. Other public agencies have opted to allow “free-parking” for carsharing operators. Table 3 provides a list of local jurisdictions and public agencies that require a parking permit or fee for a carsharing vehicle to be parked.   |
| Signage, Installation, and Maintenance | Almost all public agencies allocating on-street and off-street parking to carsharing operators allow special signage to denote carsharing spaces. Some public agencies regulate signage so they conform to local requirements. Many public agencies formally negotiate requirements for maintenance either through real estate lease agreements or informally with an operator on an as-needed basis.  |
| Parking Enforcement                    | Enforcement is critical to ensure that carsharing vehicles are parked in their designated locations and that non-carsharing vehicles do not occupy a carsharing “only” parking space. Some public agencies have created provisions for unique license plates and ticketing/towing authority. Many state/provincial vehicle codes do not define carsharing as a vehicle class, and therefore, many jurisdictions lack the authority to tow, boot, and/or ticket non-carsharing vehicles parked in a carsharing-only parking space.  |
| Impact Studies                         | A few public agencies have required carsharing operators to implement impact studies documenting the transportation, social, and environmental impacts of carsharing both when considering carsharing parking policy and at regular intervals after a carsharing parking policy has been implemented. At present, most public agencies requiring impact studies do not release the results and infrequently link policy decisions to the outcome of such studies. Table 3 provides a list of local jurisdictions and public agencies that require carsharing impact data and/or impact studies at regular intervals from carsharing providers.   |
| Public Involvement                     | Some public agencies require that carsharing operators work with local neighborhoods and community groups to gain approval for the location of carsharing parking spaces prior to their installation.  |

### **Carsharing Parking Supply in North America**

The authors' survey of carsharing operators was conducted between January and May 2008; it included 28 North American operators. This survey found that 69% of U.S. carsharing operators and 62% of Canadian carsharing operators had access to on-street parking. U.S. and Canadian carsharing providers claimed a total of 415 and 27 on-street parking spaces, respectively. At this time, on-street parking accounted for an estimated 8% and 2% of carsharing parking in the U.S. and Canada, respectively.

Carsharing operators indicated that the remainder of their parking included a combination of public and private off-street parking lots and garages. Although North American carsharing operators were unable to provide the exact number of public and private off-street parking, 11 North American operators (seven in the U.S. and four in Canada) indicated a 2:1 ratio between private sector and public off-street parking when estimating their off-street parking supply.

### **North American Carsharing Parking Policy Status**

The authors also conducted 34 expert interviews with public officials in governmental agencies involved in developing and administering carsharing and parking policies in the U.S. In Canada, several carsharing organizations provided information based upon their interactions with governmental agencies. In total, the authors identified 17 local jurisdictions out of 57 (four cities in Canada and 13 cities in the U.S.) and one state (California) with formal and informal policies, pilot projects, and proposed legislation focused on on-street and public off-street carsharing parking. Eight North American public transit operators provide carsharing parking at their facilities (one in Canada and seven in the U.S.). Of the 17 North American cities with carsharing parking policies, three have adopted carsharing parking policies as part of pilot programs including: Arlington County, Virginia; Austin, Texas; and Los Angeles, California. Finally, California has ratified a bill amending the state's vehicle code that enables city and county governments to designate areas for exclusive-use carsharing parking (20).

The authors categorized local jurisdictions and transit agencies as having a carsharing parking policy if one or more of the following conditions were met. The jurisdiction or agency: 1) provides on-street carsharing parking in the public right-of-way or off-street carsharing parking in a public municipal or transit agency parking garage; 2) maintains an official ordinance or codified policy for approving and allocating carsharing parking or has delegated this authority to a public authority; 3) approves and allocates carsharing parking on a case-by-case basis (e.g., council resolutions and zoning variances); or 4) negotiates a real estate agreement or other formal contract between the local jurisdiction/public agency and the carsharing operator for the lease or use of carsharing parking.

In some areas, these policies are formalized through written regulations, local ordinances, or user agreements or contracts that provide special parking use to carsharing organizations. In other areas, the policies are more informal and are typically determined by agency staff and/or on a case-by-case approval basis. The policy provisions and fees associated with these on-street and public off-street parking spaces vary by location. Some of the municipal parking policies include: 1) provisions for on-street parking; 2) exemption from parking time limits; 3) creation of carsharing parking zones; 4) free or reduced cost parking spaces and/or parking permits; 5) universal parking permits (i.e., carsharing vehicles can be returned to any on-street location); and 6) formalized processes for assigning on-street parking spaces. A summary of the North American policies is provided in Table 3 below. This table is divided into on-street carsharing parking (denoted in gray) and off-street carsharing parking (denoted in white). The table highlights the seven key elements of North American carsharing parking policy.

**TABLE 3 Overview of North American Carsharing Parking Policies**

|  | ON-STREET PARKING            |             |                         |                   |                                 |                    |                               | PUBLIC OFF-STREET PARKING |                         |                                 |                    |
|--|------------------------------|-------------|-------------------------|-------------------|---------------------------------|--------------------|-------------------------------|---------------------------|-------------------------|---------------------------------|--------------------|
|  | On-Street Parking Allocation | Parking Cap | Fees & Permits Required | On-Street Signage | Impact Studies Required To Park | Public Involvement | Off-Street Parking Allocation | Parking Cap               | Fees & Permits Required | Impact Studies Required To Park | Public Involvement |
| <b>LOCAL GOVERNMENT</b>                                |                              |             |                         |                   |                                 |                    |                               |                           |                         |                                 |                    |
| Arlington County, VA                                   | X                            | X           |                         | X                 |                                 |                    | X                             | X                         | X                       |                                 | X                  |
| Austin, TX   | X                            |             |                         | X                 |                                 |                    |                               |                           |                         |                                 |                    |
| Baltimore, MD  | X                            |             |                         | X                 |                                 |                    | X                             |                           |                         |                                 |                    |
| Bellingham, WA   | X                            |             |                         | X                 |                                 |                    |                               |                           |                         |                                 |                    |
| Brookline, MA  | X                            |             | X                       | X                 |                                 |                    |                               |                           |                         |                                 |                    |
| Cambridge, MA  | X                            |             |                         | X                 |                                 |                    | X                             |                           |                         |                                 |                    |
| Duncan, BC   |                              |             |                         |                   |                                 |                    | X                             |                           |                         |                                 |                    |
| Los Angeles, CA  | X                            |             |                         | X                 |                                 |                    |                               |                           |                         |                                 |                    |
| Montreal, QC   | X                            |             | X                       | X                 |                                 |                    |                               |                           |                         |                                 |                    |
| Philadelphia, PA                                       | X                            |             | X                       | X                 | X                               | X                  |                               |                           |                         |                                 |                    |
| Portland, OR   | X                            | X           | X                       | X                 | X                               | X                  |                               |                           |                         |                                 |                    |
| Salt Lake City, UT                                     | X                            |             | *                       | X                 |                                 |                    |                               |                           |                         |                                 |                    |
| San Francisco, CA                                      | X                            |             |                         | X                 |                                 |                    | X                             |                           | X                       |                                 |                    |
| Seattle, WA  | X                            |             |                         | X                 |                                 |                    |                               |                           |                         |                                 |                    |
| Toronto, ON  | X                            |             |                         | X                 |                                 |                    |                               |                           |                         |                                 |                    |
| Vancouver, BC  | X                            |             |                         | X                 |                                 |                    |                               |                           |                         |                                 |                    |
| Washington, DC   | X                            | X           |                         | X                 | X                               | X                  |                               |                           |                         |                                 |                    |
| <b>PUBLIC TRANSIT OPERATOR</b>                         |                              |             |                         |                   |                                 |                    |                               |                           |                         |                                 |                    |
| Bay Area Rapid Transit District                        |                              |             |                         |                   |                                 |                    |                               |                           |                         |                                 |                    |
| San Francisco, CA                                      |                              |             |                         |                   |                                 |                    | X                             | X                         | X                       | X                               | X                  |
| Chicago Transit Authority                              |                              |             |                         |                   |                                 |                    |                               |                           |                         |                                 |                    |
| Chicago, IL  |                              |             |                         |                   |                                 |                    | X                             | X                         | X                       |                                 |                    |
| Metropolitan Atlanta Rapid Transit Authority           |                              |             |                         |                   |                                 |                    |                               |                           |                         |                                 |                    |
| Atlanta, GA  |                              |             |                         |                   |                                 |                    | X                             |                           |                         |                                 |                    |
| Metropolitan Transportation Authority                  |                              |             |                         |                   |                                 |                    |                               |                           |                         |                                 |                    |
| New York, NY   |                              |             |                         |                   |                                 |                    | X                             |                           | X                       |                                 |                    |
| New Jersey Transit                                     |                              |             |                         |                   |                                 |                    |                               |                           |                         |                                 |                    |
| Newark, NJ   |                              |             |                         |                   |                                 |                    | X                             |                           |                         |                                 |                    |
| Translink  |                              |             |                         |                   |                                 |                    |                               |                           |                         |                                 |                    |
| Vancouver, BC  |                              |             |                         |                   |                                 |                    | X                             |                           |                         |                                 |                    |
| TriMet   |                              |             |                         |                   |                                 |                    |                               |                           |                         |                                 |                    |
| Portland, OR   |                              |             |                         |                   |                                 |                    | X                             |                           | X                       |                                 |                    |
| Washington Metropolitan Area Transit Authority (WMATA) |                              |             |                         |                   |                                 |                    | X                             | X                         |                         |                                 |                    |
| <b>STATE GOVERNMENT</b>                                |                              |             |                         |                   |                                 |                    |                               |                           |                         |                                 |                    |
| California   | X                            |             |                         |                   |                                 |                    |                               |                           |                         |                                 |                    |

\* Carsharing operator in Salt Lake City receives free metered parking under a municipal program that provides free parking for certain Utah and Environmental Protection Agency designated clean vehicles (21).

**A Framework for Carsharing Parking Policy**

Based upon this North American carsharing parking policy research, the authors have developed three approaches that local governments and public transit operators might use in formulating carsharing parking policies. These policy approaches include a sample or suggested policy framework for the following elements: 1) allocation; 2) caps; 3) fees/permits; 4) signage, installation, and maintenance; 5) enforcement; 6) impact studies; and 7) public involvement,

which each reflect varying degrees of governmental support. The first framework, “carsharing as an environmental benefit,” is an example of maximum governmental support. The second, “carsharing as a sustainable business,” provides moderate carsharing support, and the final framework, “carsharing as a business,” provides a minimum level of support. Many local governments and public agencies that were early adopters of carsharing parking policy developed parking policies that emphasized the environmental and sustainability aspects of carsharing, thereby providing moderate to maximum governmental support in their policies. For example, Portland, the District of Columbia, and the Bay Area Rapid Transit (BART) District created formal policies, adopted parking caps, and required impact studies. Two of these jurisdictions also adopted a fee structure and implemented a procedure for incorporating public involvement. Although existing carsharing parking policies could be classified into this model, this framework is primarily designed to assist in new policy development. The details of these frameworks are described in Table 4 below.

**TABLE 4 Carsharing Parking Policy Approaches for Local Governments**

|  | <b>Carsharing as an Environmental Benefit</b><br><i>Maximum Governmental Support</i>   | <b>Carsharing as a Sustainable Business</b><br><i>Moderate Governmental Support</i>   | <b>Carsharing as a Business</b><br><i>Minimum Governmental Support</i>   |
|--|--|---|--|
| <b>Parking Allocation</b>  | Jurisdiction may allocate parking spaces on a case-by-case basis or through more informal processes, such as non-binding council/board of director resolutions.  | Jurisdiction that previously allocated parking spaces through an informal process, formalizes this process.   | Jurisdiction maintains a highly formalized and established process for carsharing parking space allocation, including a process for apportioning among multiple carsharing operators.  |
| <b>Parking Caps (i.e., limit on number of carsharing spaces)</b> | Does not impose any cap on the number of carsharing spaces or percentage of spaces that may be converted to carsharing   | May impose a cap on the number and location of carsharing spaces or the total percentage of spaces jurisdiction-wide that may be converted to carsharing  | Imposes a cap on the number and location of carsharing spaces or the total percentage of spaces jurisdiction-wide, which may be converted to carsharing  |
| <b>Fees and Permits</b>  | Recognizing the social and environmental benefits of carsharing, parking is provided free-of-charge or significantly below market cost.  | Fees may be based on cost recovery of parking provision (i.e., foregone meter revenue, administrative costs, etc.). Fees may be reduced to reflect environmental goals, such as charging a reduced carpool rate for carsharing parking. | Fees are based on a cost recovery or profit-based methodology. This could include permit costs, lost meter revenue, and administrative expenses for program management.  |
| <b>Signage, Installation, and Maintenance</b>                    | Jurisdiction pays for sign production and installation, striping and marking costs, as well as maintenance.  | Jurisdiction pays for sign installation, as well as striping and markings; operator pays for sign production and maintenance costs.   | Requires carsharing operator to pay for the production and installation of signage, as well as striping, marking, and maintenance costs.   |
| <b>Parking Enforcement</b>                                       | Local police may maintain ticket authority. Citations for parking in carsharing stalls are greater than most other parking violations.   | Local police may maintain ticket/citation authority.  | Local police may have ticketing authority. Citations for parking in carsharing spaces are the same as most other parking violations.   |
| <b>Social and Environmental Impact Studies</b>                   | Requires that carsharing operators study and document local social and environmental benefits at regular intervals   | May require that carsharing operators study and document local social and environmental benefits on a one-time basis or at regular intervals  | Does not require any (or could require minimal) social and environmental impact carsharing reporting   |
| <b>Public Involvement</b>  | This is an informal process to elicit public input into the location and number of carsharing parking spaces allocated. It is led by the jurisdiction, and staff may determine this internally without public comment. | This is an informal process where the jurisdiction and carsharing organization seek public input into the location and number of carsharing parking spaces through public notification, and staff manage possible public concerns.      | This is a highly formalized process where the carsharing organization is responsible for obtaining public input and approval on the location and number of carsharing parking spaces through neighborhood councils, commissions, or formal hearings. |

It is important to note that public involvement is a notable aspect of carsharing parking allocation and should be incorporated into the process, if possible. Public involvement can reduce opposition to the conversion of pre-existing parking stalls and provide both jurisdictions and operators with valuable information on the highest demand/highest potential use locations. The public involvement methods employed should reflect the unique institutions and policy procedures established by each jurisdiction. Examples of public involvement include endorsement by neighborhood councils (as in Washington, D.C.); a public comment, hearing, and approval process for the allocation of parking spaces; or an appointed/elected body to comment or approve parking requests. Some jurisdictions have provided city councils and parking authorities with varying degrees of authority over carsharing parking, which can include regular public meetings and public comment periods. In the next section, the authors present findings from their Bay Area carsharing parking case study and results from a public opinion survey regarding the provision of on-street carsharing parking.

### **CARSHARING PARKING IN THE SAN FRANCISCO BAY AREA: A CASE STUDY**

Three jurisdictions were examined as part of the San Francisco Bay Area carsharing case study: 1) San Francisco, 2) Berkeley, and 3) the BART District. This region was selected for the case study analysis because it has a long carsharing history, the authors reside in this region, and the public perception survey was conducted there. Furthermore, it illustrates the carsharing parking policy approaches of two cities and a public transit operator.

The San Francisco Bay Area is the twelfth largest metropolitan region in the U.S. with 7.2 million people. Private vehicles account for the greatest weekday modal share (80%), followed by walking (10.2%), public transit (6.2%), and bicycling (1.5%) (22). The remaining trips are made by other alternative modes. Some trends affecting carsharing services in the San Francisco Bay Area include: 1) a relatively higher income and cost of living and 2) a greater percentage of individuals with a college degree or other advanced degree. Additionally, many areas in the region have limited on-street parking and expensive off-street parking. Of all the North American cities that allocate on-street carsharing parking, San Francisco only has two parking spaces that were approved on a one-time basis.

Carsharing first appeared in San Francisco from 1983 to 1985 with the Short-Term Auto Rental (STAR) demonstration project. In 2001, carsharing services re-emerged in San Francisco with the launch of City CarShare, a non-profit carsharing provider. In August and October 2005, two for-profit operators—Flexcar and Zipcar—also launched their services. Later, they merged under the name Zipcar in October 2007. In 2007, for-profit U-Haul launched its U-CarShare service in the region. At present, most of U-CarShare's fleet of PT Cruiser vehicles is parked at U-Haul locations within Berkeley. As of July 2009, City CarShare, Zipcar, and U-CarShare served San Francisco, Oakland, and Berkeley with limited service at colleges and universities in the Peninsula and South Bay.

In July 2009, there were an estimated 50,000 carsharing members and 1,100 carsharing vehicles in the San Francisco metropolitan area. The Bay Area represents an estimated 16% of the U.S. carsharing market measured by membership, and it accounts for approximately 18% of the U.S. carsharing vehicle fleet deployed. To date, the BART District has developed a carsharing parking policy, while San Francisco and Berkeley are in the process of formulating their policies. A summary of carsharing parking policies/approaches in these jurisdictions is provided in Figure 1 below.

|   |
|---|
| <p><b>San Francisco</b></p> <ul style="list-style-type: none"> <li>• San Francisco provides public off-street parking in municipal parking lots to City CarShare at a discounted carpool rate (approximately 50% of the full monthly rate) (Anita Daley, unpublished data).</li> <li>• In March 2009, the Port of San Francisco began to consider whether or not to require carsharing parking and electric vehicle charging station allocations to be included in the lease renewals for off-street parking (23).</li> <li>• City CarShare and Zipcar each have two on-street parking spaces, provided free-of-charge and approved on a one-time basis by the San Francisco Board of Supervisors. Both operators received additional spaces to showcase the mayor's Plug-In Hybrid-Electric Vehicle (PHEV) initiative (24).</li> <li>• The San Francisco Municipal Transportation Agency plans to re-evaluate off-street and on-street carsharing policies in 2010 after they complete the San Francisco parking pilot project, <i>SFpark</i>, which employs demand-responsive parking methods to manage pricing and availability throughout the day in several of the city's parking districts (Nita Rabe-Uyeno, unpublished data).</li> <li>• San Francisco is paying to add electric charging infrastructure so that carsharing fleets can include PHEVs (25).</li> </ul> |
| <p><b>Berkeley</b></p> <ul style="list-style-type: none"> <li>• In 2002, Berkeley's city council allocated funding for City CarShare to install two on-street parking spaces (Anita Daley, unpublished data).</li> <li>• Six spaces were designated informally for City CarShare fleet vehicles to park in municipal lots when Berkeley entered into a fleet reduction contract with City CarShare in 2004 (Anita Daley, unpublished data).</li> <li>• Berkeley is developing a policy for allocating on-street carsharing parking and would like to bring a formal policy proposal to the City Council in 2009 (26).</li> <li>• Berkeley is paying to add electric charging infrastructure so that carsharing can include PHEVs (25).</li> </ul>   |
| <p><b>Bay Area Rapid Transit (BART) District</b></p> <ul style="list-style-type: none"> <li>• In July 2002, the BART District and City CarShare entered into an official pilot program in which BART allocated up to 24 parking spaces at various stations. Initially, two carsharing vehicles were placed per station "free-of-charge" at one of BART's San Francisco and two East Bay stations (Kevin Hagerty, unpublished data).</li> <li>• In 2006, two additional for-profit companies, Flexcar and Zipcar, launched carsharing services in the Bay Area market. BART's board approved parking for Flexcar and Zipcar, allocating eight parking spaces to each operator. In 2007, when Flexcar and Zipcar merged, Zipcar acquired the Flexcar parking spaces at BART (Kevin Hagerty, unpublished data).</li> <li>• BART has a policy of only allowing a maximum of three parking spaces per operator at each station (Kevin Hagerty, unpublished data).</li> <li>• BART charges the monthly permit fee of the respective station (as they vary by station), ranging from \$63 to \$115 per month per space (27).</li> </ul>  |

**FIGURE 1 Carsharing parking approaches in the San Francisco Bay Area.**

To summarize, both San Francisco and Berkeley provide parking spaces for PHEV carsharing vehicles at no charge and are in the process of further developing their policies (2009 to 2010 timeframe). City CarShare receives a reduced rate for off-street parking in San Francisco, as well as six free spaces as part of their role in Berkeley's fleet reduction program. BART has conducted a carsharing parking pilot program and adopted more formal policies regarding the number of carsharing parking spaces allocated per station and operator, as well as

monthly permit fees, which do not reflect operator discounts. In the next section, the authors provide results from the Bay Area carsharing parking public perception survey.

### **CARSHARING PARKING IN THE SAN FRANCISCO BAY AREA: PUBLIC PERCEPTION SURVEY**

In September 2008, the authors administered an intercept survey in the San Francisco Bay Area to understand the public's perceptions and opinions about the provision of on-street carsharing parking. The objective was to gauge the public's reaction to the reassignment of public spaces to carsharing operators.

Several U.S. carsharing organizations participated in the pretesting of the questionnaire and provided comments on the design. Researchers selected intercept locations in urban areas with rail and bus transit, carsharing service, and on- or off-street carsharing parking. These areas are typical of those where carsharing parking is or might be located, and respondents in these areas were more likely to have exposure and knowledge of carsharing and public parking availability.

Researchers collected a total of 425 clipboard surveys at four locations: 1) Downtown San Francisco near City Hall/Civic Center (19%); 2) the Rockridge neighborhood and nearby the Rockridge BART station in Oakland (39%); 3) Downtown Oakland near the Convention Center (28%); and 4) Downtown Berkeley between the Downtown Berkeley BART station and Berkeley City Hall (28%). Because the survey was an intercept survey, the respondent pool is subject to some degree of self-selection. The survey was also administered in locations that had a high degree of transit accessibility via both rail and bus. In addition, all of the locations had limited parking supply as they were all urban locations. The Rockridge neighborhood was the least dense and most residential of the selected sites. This neighborhood is a high traffic commercial main street that is a destination for many as well as a key route to the University of California. Thus, the survey provides preliminary insight as to whether there are critical trends in support or opposition of carsharing parking. However, these results cannot necessarily characterize the balance of opinions in other regions of the country, which may be different. For similar regions, nevertheless, this survey can inform researchers of what to explore and perhaps enable improvements in future studies.

#### **Survey Results**

The demographics of the respondents illustrate a working age population with a racial mix slightly tilted towards Caucasians and Asians in comparison to the general population. The survey respondents were split equally by gender. A little more than two-thirds were between the ages of 18 to 45 (68%), an additional 17% were between the ages of 46 and 55, and 11% were between 56 and 65. Only, 3% of the sample was older than 65. Most identified themselves as Caucasian (63%), followed by Asian (11%), then African American and Latino (each at 9%), and finally Native American and Pacific Islander races constituted 2%, collectively.

Respondents were asked whether they were familiar with carsharing prior to the survey. Eighty-six percent of the sample indicated that they were familiar with it, while 10% also were members of a carsharing organization. The respondents were then asked a series of questions about their relationship to the neighborhood in which they were surveyed, their perception of local on-street parking, and relative support or opposition to allocating certain types of existing spaces towards carsharing. The results show that respondents were generally more supportive of allocating parking to carsharing than they were against it. However, there are some key caveats that should be noted.

Respondents had different relationships with the neighborhood in which they were surveyed. Some lived locally, others worked locally, while others were visiting for a variety of reasons. How these groups reacted to parking for carsharing was different. First, it is important to understand how they perceived parking supply within their neighborhood. Table 5 shows the respondent's perception of parking supply as defined by their location when taking the intercept survey and the reason they were in the region.

**TABLE 5 Perception of Parking Supply by Location and by Purpose at Intercept Location**

|  | Response Category                                | Way too little parking. I wish there was more | It would be nice to have more parking | There is just enough parking | There is too much parking, there should be less | Unsure | No opinion | Other | Total (Repondents) |
|--|--|---|---------------------------------------|------------------------------|---|--------|------------|-------|--------------------|
| Within this neighborhood, what is your opinion of on-street parking supply (or the amount of on-street parking)? | Civic Center SF                                  | 21%   | 25%                                   | 27%                          | 5%  | 3%     | 8%         | 11%   | 75                 |
|  | Rockridge Bart                                   | 17%   | 32%                                   | 32%                          | 3%  | 1%     | 6%         | 8%    | 161                |
|  | Downtown Berkeley                                | 35%   | 30%                                   | 13%                          | 4%  | 0%     | 5%         | 14%   | 111                |
|  | Downtown Oakland                                 | 18%   | 32%                                   | 21%                          | 5%  | 0%     | 9%         | 16%   | 57                 |
|  | All Together (%)                                 | 23%   | 30%                                   | 24%                          | 4%  | 1%     | 6%         | 11%   | 404                |
|  |  |   |                                       |                              |   |        |            |       |                    |
| What is the primary purpose of your trip today?  | I work or attend school in the neighborhood      | 28%   | 29%                                   | 23%                          | 1%  | 1%     | 5%         | 12%   | 164                |
|  | I am a resident and live in the neighborhood     | 17%   | 32%                                   | 32%                          | 6%  | 1%     | 5%         | 7%    | 95                 |
|  | I am visiting the neighborhood for shopping      | 29%   | 40%                                   | 14%                          | 0%  | 0%     | 6%         | 11%   | 35                 |
|  | I am visiting the neighborhood for dining        | 19%   | 37%                                   | 15%                          | 19%   | 0%     | 0%         | 11%   | 27                 |
|  | I am visiting the neighborhood to participate in | 21%   | 14%                                   | 28%                          | 5%  | 0%     | 19%        | 14%   | 43                 |
|  | Other  | 16%   | 38%                                   | 24%                          | 3%  | 3%     | 3%         | 14%   | 37                 |
|  | Total (Respondents)                              | 92  | 122                                   | 97                           | 16  | 4      | 25         | 45    | 401                |

Table 5 shows that most respondents felt that more parking is desired within the neighborhood. This was generally true regardless of the neighborhood and regardless of the reason the respondent was in the area. That is, both residents and visitors in each neighborhood generally felt that parking was not in oversupply, and this is important when considering their general support for allocating some of this limited parking supply to carsharing.

Table 6 illustrate how people at different survey sites for a variety of reasons either supported or opposed carsharing parking in that location. Table 6(a) presents respondents' relationship with the neighborhood as classified by the specific neighborhood. Table 6(b) shows the relative support or opposition that respondents had for converting specific types of parking spaces within the respective neighborhood. The percents shown are the "percent of respondents within the neighborhood" as defined by the column in both sections of the table.

**TABLE 6 Respondent Relationship with Neighborhood and Support for Carsharing Parking**

| <b>(a) What is the primary purpose of your trip today?</b>                         |                 |  |                |  |                   |  |                  |  |            |  |
|--|-----------------|--|----------------|--|-------------------|--|------------------|--|------------|--|
| Response \ Location  | Civic Center SF |  | Rockridge Bart |  | Downtown Berkeley |  | Downtown Oakland |  | Total      |  |
|  |                 |  |                |  |                   |  |                  |  |            |  |
| I work or attend school in the neighborhood  | 50%             |  | 27%            |  | 50%               |  | 51%              |  | 173        |  |
| I am a resident and live in the neighborhood                                       | 13%             |  | 32%            |  | 20%               |  | 19%              |  | 98         |  |
| I am visiting the neighborhood for shopping  | 6%              |  | 13%            |  | 5%                |  | 3%               |  | 35         |  |
| I am visiting the neighborhood for dining  | 5%              |  | 7%             |  | 6%                |  | 8%               |  | 28         |  |
| I am visiting the neighborhood to participate in recreational or social activities | 12%             |  | 10%            |  | 14%               |  | 7%               |  | 46         |  |
| Other  | 14%             |  | 10%            |  | 5%                |  | 12%              |  | 41         |  |
| <b>Total</b>   | <b>78</b>       |  | <b>166</b>     |  | <b>118</b>        |  | <b>59</b>        |  | <b>421</b> |  |

  

| <b>(b) Which types of spaces would you oppose/support converting for the purpose of designated carsharing use only?</b> |                 |         |                |         |                   |         |                  |         |            |         |
|---|-----------------|---------|----------------|---------|-------------------|---------|------------------|---------|------------|---------|
| Response \ Location   | Civic Center SF |         | Rockridge Bart |         | Downtown Berkeley |         | Downtown Oakland |         | Total      |         |
|   | Oppose          | Support | Oppose         | Support | Oppose            | Support | Oppose           | Support | Oppose     | Support |
| Metered parking   | 37%             | 39%     | 24%            | 56%     | 29%               | 47%     | 35%              | 53%     | 124        | 213     |
| Taxi zones  | 22%             | 47%     | 19%            | 49%     | 18%               | 45%     | 13%              | 47%     | 77         | 200     |
| Truck loading zones   | 25%             | 32%     | 29%            | 36%     | 25%               | 30%     | 30%              | 37%     | 116        | 143     |
| "No parking" or "No Stopping Zones"   | 19%             | 39%     | 20%            | 43%     | 22%               | 39%     | 15%              | 53%     | 83         | 182     |
| On-street permitted parking   | 30%             | 28%     | 26%            | 46%     | 20%               | 35%     | 25%              | 47%     | 107        | 169     |
| Reallocating existing parking spaces  | 18%             | 44%     | 17%            | 46%     | 13%               | 45%     | 17%              | 43%     | 67         | 191     |
| Other   | 3%              | 6%      | 1%             | 5%      | 8%                | 7%      | 8%               | 2%      | 17         | 23      |
| I would be fine with any of these spaces being converted  | 6%              | 22%     | 5%             | 19%     | 6%                | 21%     | 3%               | 22%     | 23         | 87      |
| <b>Total Respondents at the location</b>  | <b>79</b>       |         | <b>167</b>     |         | <b>119</b>        |         | <b>60</b>        |         | <b>425</b> |         |

Table 6(a) shows that half of the people surveyed in the downtown locations were there for work or school. Rockridge was more atypical with nearly a 30-30 split between workers and residents. Table 6(b) provides the percentage of people that supported or opposed the conversion of a specific type of space to a dedicated carsharing space. Respondents were allowed to pick more than one response, so the percentages do not sum to 100, but reflect the percentage of respondents electing each specific option among others. With a few exceptions, more people supported the conversion of spaces to carsharing than opposed them in each neighborhood. This occurred because a typical respondent supported the conversion of more spaces than they opposed. For example, roughly 70% of all respondents opposed the conversion of at least one type of space, while 93% of all respondents supported the conversion of at least one type of space. Thus, most respondents had opinions about the types of spaces that they would support and oppose for carsharing conversion. Table 7 illustrates this result in the context of the respondent's relationship with the neighborhood.

**TABLE 7 Neighborhood Relationship and Carsharing Parking Support and Opposition**

| Purpose of Trip<br>Type of Space                         | I work or attend school in the neighborhood |         | I am a resident and live in the neighborhood |         | I am visiting the neighborhood for shopping |         | I am visiting the neighborhood for dining |         | I am visiting the neighborhood to participate in recreational or social activities |         | Other  |         |
|--|---|---------|--|---------|---|---------|---|---------|--|---------|--------|---------|
|  | Oppose                                      | Support | Oppose                                       | Support | Oppose                                      | Support | Oppose                                    | Support | Oppose   | Support | Oppose | Support |
| Metered parking  | 36%   | 46%     | 19%  | 66%     | 31%   | 40%     | 25%                                       | 46%     | 22%  | 48%     | 34%    | 49%     |
| Taxi zones   | 19%   | 46%     | 17%  | 51%     | 23%   | 43%     | 18%                                       | 36%     | 11%  | 57%     | 20%    | 46%     |
| Truck loading zones                                      | 23%   | 31%     | 31%  | 41%     | 23%   | 34%     | 39%                                       | 32%     | 24%  | 43%     | 37%    | 20%     |
| "No parking" or "No Stopping Zones"                      | 22%   | 40%     | 19%  | 45%     | 17%   | 40%     | 18%                                       | 43%     | 20%  | 50%     | 15%    | 46%     |
| On-street permitted parking                              | 27%   | 35%     | 23%  | 54%     | 17%   | 46%     | 36%                                       | 32%     | 26%  | 37%     | 22%    | 34%     |
| Reallocating existing parking spaces                     | 13%   | 43%     | 19%  | 51%     | 20%   | 40%     | 25%                                       | 46%     | 11%  | 54%     | 12%    | 34%     |
| Other  | 6%  | 5%      | 2%   | 6%      | 0%  | 6%      | 4%  | 0%      | 7%   | 9%      | 2%     | 5%      |
| I would be fine with any of these spaces being converted | 7%  | 20%     | 3%   | 22%     | 9%  | 17%     | 4%  | 25%     | 2%   | 20%     | 7%     | 20%     |
| Total persons within PURPOSE OF TRIP Category            | 173   |         | 98   |         | 35  |         | 28  |         | 46   |         | 41     |         |

Table 7 also shows that support for converting some spaces to carsharing generally outweighs opposition. In particular, the difference between percentages of support and opposition are largest among those who are neighborhood residents. This result is important because it suggests that allocating parking for carsharing may receive less opposition from locals than from people commuting into the neighborhood. In addition, the data also show that opposition to converting some spaces within a neighborhood is not insignificant. That is, the conversion of any of the listed spaces was opposed by at least 20% of people living in a neighborhood. Hence, while support does outweigh opposition, there was no type of space that was universally endorsed for conversion to carsharing parking.

Finally, respondents were also asked whether they thought carsharing organizations should compensate the city for on-street spaces. About half thought that they should (48%), approximately one third thought they should not (33%), and the remaining were unsure. When respondents were asked whether a different policy should exist for granting on-street parking to for-profit versus non-profit carsharing providers. About 61% agreed, while 23% thought there should be no difference, with the rest uncertain. More than half of the respondents (53%) indicated that carsharing operators should be required to obtain consent from neighboring

residents and businesses before converting a parking space to carsharing. This emphasizes the importance of public involvement in carsharing parking policy development.

Overall, respondents, and particularly residents, offered more support than opposition to allocating parking to carsharing. While the survey suggests support, it does not reflect a unanimous endorsement of parking for carsharing and finds that a large portion of the respondents feel that carsharing organizations should compensate the city for spaces.

## **CONCLUSION**

This paper examines North American carsharing parking policies, presents a model framework for carsharing parking development (ranging from maximum, moderate, and minimum governmental support), highlights three jurisdictions' carsharing parking policies/approaches in the San Francisco Bay Area, and analyzes public reaction to carsharing parking policies in the Bay Area to help inform future carsharing parking development.

In North America, 17 local jurisdictions out of over 57 localities have a combination of formal and informal policies, pilot projects, and proposed legislation focused on carsharing parking. Eight North American public transit operators provide carsharing parking in their facilities. Finally, California has ratified a bill amending the state's vehicle code allowing local governments to allocate "exclusive-use" on-street carsharing parking.

The San Francisco Bay Area carsharing parking case study features some of the policy approaches undertaken by public entities to allocate on-street, off-street, and transit-based carsharing parking. The authors' intercept survey in the Bay Area revealed that residents of a neighborhood are more inclined to support the conversion of spaces for carsharing use than opposed it. But no type of space was widely unopposed for the conversion to carsharing use. Each space had at least 20% opposing conversion. The fact that residents and not visitors were more supportive of carsharing parking is important, as it is typically residents who have the greatest influence on local parking policies. Furthermore, general support for allocating some parking to carsharing exists in an environment where a large portion of the sample felt that parking was in undersupply.

As carsharing continues to expand, public entities may find it beneficial to develop formal policies to equitably allocate carsharing parking among operators (both the number and space location). Additionally, they should incorporate public involvement into the process to ensure that stakeholder concerns are considered. In the future, supportive parking policy approaches will likely play a critical role in fostering any expansion of carsharing and could aid local jurisdictions in achieving their congestion mitigation and environmental goals.

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