Title

Carsharing

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Carsharing

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CARSHARING

Carsharing is a service in which individuals gain the benefits of private vehicle use without the costs and responsibilities of ownership. Individuals typically access vehicles by joining an organization that maintains a fleet of cars and light trucks. Fleets are usually deployed within neighborhoods and at public transit stations, employment centers, and colleges and universities. Typically, the carsharing operator provides gasoline, parking, and maintenance. Generally, participants pay a fee each time they use a vehicle (Shaheen, Cohen, & Zohdy, 2016). Carsharing includes three types of service models, based on the permissible pick-up and drop-off locations of vehicles. These are briefly described below:

- **Roundtrip** - Vehicles are picked-up and returned to the same location.
- **One-Way Station-Based** - Vehicles can be dropped off at a different station from the pick- up point.
- **One-Way Free-Floating** - Vehicles can be returned anywhere within a specified geographic zone.

This toolkit is organized into seven sections. The first section reviews common carsharing business models. The next section summarizes research on carsharing impacts. The remaining sections present policies for parking, zoning, insurance, taxation, and equity. Case studies are located throughout the text to provide examples of existing carsharing programs and policies.

Carsharing Business Models

Carsharing systems can be deployed through a variety of business models, described below:

Business-to-Consumer (B2C) – In a B2C model, a carsharing providers offer individual consumers access to a business-owned fleet of vehicles through memberships, subscriptions, user fees, or a combination of pricing models.

Business-to-Business (B2B) – In a B2B model, carsharing providers sell business customers access to transportation services either through a fee-for-service or usage fees. The service is typically offered to employees to complete work-related trips. Typically, B2B carsharing services are provided by B2C service providers.

Business-to-Government (B2G) – In a B2G model, carsharing providers offer transportation services to a public agency. Pricing may include a fee-for-service contract, per-transaction basis, or other pricing models. Typically, B2G carsharing services are provided by B2C service providers. In the United States, the General Services Administration (GSA)—an independent agency of the federal government that manages and supports the basic functioning of federal agencies—has authorized carsharing use as means to help reduce government expenditures for vehicle fleet ownership and management. At the local level, cities such as Berkeley and Philadelphia have become carsharing customers to reduce municipal vehicle fleet costs (GSA, 2018).

Peer-to-Peer (P2P) – In a P2P model (sometimes referred to as personal vehicle sharing), carsharing providers broker transactions among vehicle owners and guests by providing the organizational resources needed to make the exchange possible. Members access vehicles through a direct key transfer from the host (or owner) to the guest (or driver) or through operator-installed, in-vehicle technology that enables unattended access. Pricing and access terms for P2P carsharing services vary, as they are typically determined by vehicle hosts listing their vehicles. The P2P carsharing operator generally takes a portion of the P2P transaction amount in return for facilitating the exchange and providing third-party insurance. Examples of P2P carsharing providers in the U.S. include: Turo (formerly RelayRides) and Getaround. For example, Turo takes 15 to 35% of the commission in the U.S. (depending on the vehicle protection plan a host enrolls in), and Getaround takes 40% from the host for its services. As of January 2017, 2.9 million members shared 131,336 vehicles as part of a P2P carsharing program in North America (Shaheen, Martin, Bansal, 2018b).

Impacts of Carsharing

Studies have examined the impact of roundtrip, one-way, and P2P carsharing on travel behavior and vehicle ownership. The extent to which carsharing impacts travel behavior and vehicle ownership decisions varies according to the methodological differences and geographic locations of the studies. Table 3.1 below on the following page provides an overview of North American studies that examine carsharing impacts. These impacts are summarized as follows:

Reduced household vehicle holdings – Carsharing services offer members the benefits of vehicle access without the costs of private vehicle ownership. Canadian studies and member surveys suggest that between 15 to 29 percent of roundtrip carsharing participants sold a vehicle, while 25 to 61 percent delayed or had foregone a vehicle purchase. Studies and surveys in the U.S. indicate that 11 to 26 percent of roundtrip carsharing members sold a vehicle, and 12 to 68% postponed or avoided a vehicle purchase (Cohen & Shaheen, 2016). A reduction in vehicle ownership may result in lower vehicle miles traveled (VMT)/vehicle kilometers traveled (VKT), reduced traffic congestion and parking demand, and an increase of other transport modes (such as biking and walking) in lieu of car travel.

Reduced Vehicle Miles Traveled (VMT) – Carsharing is thought to lead to lower VMT or VKT by emphasizing variable driving costs, such as per hour and/or mileage charges. Studies in Table 3.1 indicate that members of carsharing organizations decrease VMT/KMT from three to eighty percent; however, trial members of City CarShare experienced increases in VMT/VKT.

Increased use of active transit modes – The reduction of vehicle ownership, by members selling or avoiding purchasing a vehicle, opens up a turn toward multimodality. As noted in Table 3.1, studies indicate that people walk or take public transit more after joining a carsharing service.

Change in public transit use - The impacts of carsharing services on public transit are less certain. Several studies show that participants were taking public transit less since joining a carsharing service, including members of one-way carsharing services (see Table 3.1). However, other studies report that participants took public transit more often.

Reduced greenhouse gas (GHG) emissions - Carsharing may reduce GHG emissions by decreasing vehicle ownership and encouraging use of active modes. Although there is a slight increase in emissions by providing automobile access to those who did not own one, an analysis of the aggregate GHG impacts suggest net emissions decrease among carsharing members (Martin & Shaheen, 2010).

Table 3.1 Summary of Carsharing Impacts									
Operator and Location		**Authors, Year**	Number of Vehicles Removed from the Road Per Carsharing Vehicle	Members Selling Personal Vehicle %	Members Avoiding Vehicle Purchase %	VMT/VKT Change % Per Member	Average Monthly Cost Savings per Member	Participants Walking More %	Participants Taking Public Transit More %
ROUNDTRIP CARSHARING STUDIES									
Short-Term Auto Rental *San Francisco, CA*		(Walb & Loudon, 1986)		15.4	43.1				
Arlington Carsharing (Flexcar and Zipcar) *Arlington, VA*		(Price & Hamilton, 2005)		25.0	68.0	-40		54.0	54.0
		(Price, DeMaio, & Hamilton, 2006)		29.0	71.0	-43.0		47	
Carsharing Portland *Portland, OR*		(Katzev, 1999)		26.0	53.0		154 USD		47.0
		(Cooper, Howe, & Mye)		23.0	25.0	-7.6		25.8	13.5
City Carshare *San Francisco, CA*	*Year 1*	(Cervero, 2003)		2.5	60.0	-3.0a/-58.0b			
	Year 2	(Cervero & Tsai, 2004)	6.8	29.1	67.5	-47.0a/ 73.0b			
	Year 4	(Cervero, Golub, & Nee, 2007)				-67.0a/ 24.0b			
PhillyCarshare *Philadelphia, PA*		(Lane, 2005)	10.8c	24.5	29.1	-42.0	172 USD		
TCRP Report – Surveyed Members of More Than Nine Carsharing Companies *North America*		(Millard-Ball, ter Schure, Fox, Burkhardt, & Murray, 2005)				-63.0		37.0	40.0
Surveyed Members of Eleven Carsharing Companies *U.S. and Canada*		(Martin & Shaheen, 2010)	9.0-13.0	33.0	25.0				
		(Martin, Shaheen, & Lidicker, 2010)				-27.0		12.0	22.0d
Zipcar *U.S.*		(Zipcar, 2005)	20.0	32.0	39.0	-79.8	435 USD	37.0	40.0
Modo *Vancouver, Canada*		(Namazu & Dowlatabadi, 2018)	5.0		55.0				-41.0--55.0 d
ONE-WAY CARSHARING STUDIES									
Car2Go *U.S. and Canada*		(Martin & Shaheen, 2016)	7.0-11.0	2.0-5.0	7.0-10.0	-6.0 to -16		-2.0-25.0	-43.0-3.0
Car2Go *Vancouver, Canada*		(Namazu & Dowlatabadi, 2018)	6.0		55.0				-41.0--55.0d
Car2go *San Diego, CA*		(Shaheen, Martin, & Bansal, 2018a)						25.0	-12.0
P2P CARSHARING STUDIES									
Getaround, RelayRides (Turo), and eGo Carshare *U.S.*		(Shaheen, Martin, & Bansal, 2018b)		.14	.19			13.0	1.0-2.0
Getaround *Portland, OR*		(Dill, McNeil, & Howland, 2017)			.44				-20.0e

Adapted from Shaheen et al., 2016.

[a]Reflects existing members' reduction in vehicle miles traveled/vehicle kilometers traveled (VMT/VKT).
[b]Reflects only trial members' reduction in VMT/VKT.
[c]Reflects vehicles removed by members who gave up a car.
[d]Reflects percentage of users for which carsharing was an alternative to public transit.
[e]Reflects percentage of users for which a carsharing trip replaced a public transit trip

Parking Policies for Carsharing

Dedicating parking for shared vehicles is a way public agencies can support carsharing. Some common policy considerations may include:

Parking Allocation: Carsharing parking can be allocated through a combination of formal and informal processes. Formal process include established policies that are written, codified, and/or negotiated through a formal request for proposal (RFP) process. An informal process includes approving parking through variances, special permits, and case-by-case approvals from administrative staff or an elected council. Methods for allocating parking include:

- Designating zones for on-street parking,
- Allocating parking spaces for carsharing vehicles, and
- Providing parking permits that allow parking within a specific parking zone or the use of a specific parking spot.

Parking Caps: Cities may cap the number of parking spaces. The number of parking spaces for carsharing can be limited by category (on- or off-street), operator, particular location, or service use (i.e., one parking space per every 100 members). To foster diverse carsharing business models, cities can allocate an equal number of station-based parking spaces and parking permits for free-floating services.

Public Involvement: Cities that seek to mitigate potential community concerns can incorporate public involvement in parking decisions. For example, some public agencies require public operators to work with local neighborhoods or community organizations before approving the location of carsharing parking.

Fees and Permits: Removing general-use parking may result in a loss of parking meter or permit revenue. Cities may choose to provide free parking or make up for the lost revenue by charging operators for parking. A city can charge a yearly fee to carsharing operators in return for parking permits or dedicated parking zones. The fee can be assessed based on costs associated with: 1) the price of a residential parking permit, 2) lost or foregone meter revenue, 2) costs associated with providing parking (e.g., operations, administrative cost, overhead, and maintenance); or 4) the market cost of the parking spaces provided.

Signage: Special signage may be needed to indicate carsharing parking. Public agencies can regulate signage to conform to local requirements. Maintenance of signage may be formally negotiated through real estate lease agreements or informally with the operator on an as-needed basis.

Parking Enforcement: To ensure that spaces are available for carsharing use, cities may

consider parking enforcement. Cities may need to create provisions for unique license plates or ticketing/ towing authority of carsharing vehicles and carsharing parking spaces.

Impact Studies: Public agencies may require carsharing operators to conduct impact studies documenting the transportation, social, and environmental impacts of their system before allocating carsharing parking.

Case Studies

San Francisco, CA - Station-Based Carsharing

The San Francisco Municipal Transportation Agency (SFMTA) established a pilot for carsharing parking. To participate, eligible carsharing companies had to:

- Make vehicles available to members by reservation on an hourly basis or in smaller intervals at rates based on time or time and distance.
- Make vehicles available to members on a 24-hour, seven day a week basis.
- Make vehicles available to members at least 75% of the time during any given month when the vehicle is parked in a designated on-street carsharing parking space.
- At least 15% of the total fleet had to be located in an On-Street Car Share Zone 2 and at least 15% in an On-Street Car Share Zone 3 (See Figure 3.1).
- Provide SFMTA with quarterly reports on the number of members by zip code, vehicle location, trip duration, VMT, usage rate, and other operational metrics.
- Provide SFMTA with data from member surveys on travel behavior, vehicle ownership, and carsharing use.

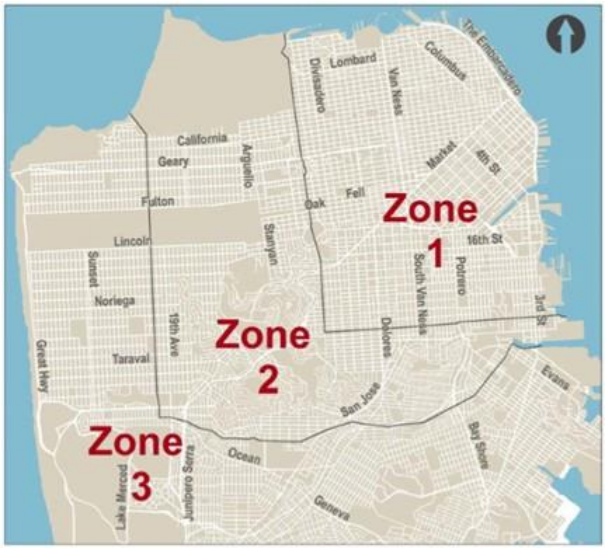

Figure 3.1. On-Street Carsharing Permit Pricing Zones. Photo Courtesy of SFMTA On-Street Car Sharing Pilot Program Evaluation Report

Three entities were chosen for the pilot program: City CarShare, Zipcar, and Getaround. Each operator proposed 150 parking space locations, which were reviewed by SFMTA and other city agencies. Parking space proposals were brought to the SFMTA Board of Directors for deliberation and approval. During the pilot program, 215 on-street parking spaces were dedicated for carsharing. At the completion of the pilot program, SFMTA

found that on-street parking increased shared vehicle access, convenience, and visibility (SFMTA, 2017).

Following the pilot, San Francisco approved an On-Street Shared Vehicle Permit Program in July 2017. Under the program, permits are issued only to qualified Vehicle Sharing Organizations who provide fleets of shared vehicles and meet the following requirements:

- Conduct outreach when selecting locations for parking spaces,
- Provide ongoing usage data to the SFMTA,
- Provide a sufficient share of vehicle locations in areas throughout the city, and
- Satisfy other requirements specified in the permit.

Unlike the pilot program, permits are no longer available for P2P carsharing services (SFMTA, 2019). As of early 2019, SFMTA has evaluated permit applications for: City CarShare (now powered by Getaround), Maven, Zipcar, and UhaulCarShare. Fees for the on-street spaces will be applied using the same three-zone system used during the pilot (Figure 3.1) and cost $59 to $300 per month, depending on the zone. To ensure geographic equity, SFMTA requires permittees to place a minimum of 15% of their vehicles in Zone 2 and a minimum of 15% of their vehicles in Zone 3. Participants must share the following data every month:

- Number of reservations per space,
- Number of unique users per space, and
- Length of trip (miles/time) per space.

SFMTA will also work with permitted carsharing programs to develop a member survey that asks members about their travel behavior, vehicle ownership, and vehicle use (SFMTA, 2017).

Seattle, WA - Designated Space Parking and Free-Floating Carsharing

Seattle provides parking permits to carsharing through either a free-floating permit or designated space permit. Under the Designated Space Car Share Permit program, operators can apply for a permit that allows vehicles to be parked in designated on-street or private parking areas. Permits cost $300 annually for unpaid parking spaces or $3,000 annually for paid parking spaces.

Under the free-floating carsharing permit program, operators can apply for permits to park vehicles at any legal paid parking space in the city without payment or time restrictions. Each free-floating carsharing permit costs $1,730 annually.

Permit holders for both programs must meet the following requirements:

- Demonstrate within two years of beginning operations that they serve the entire city (operators may be requested to provide documentation on the number and location of vehicles);
- Annually report information regarding their fleet, membership (including demographics), and on- and off-street locations;
- Conduct an annual membership survey during the first two months of each permit year and submit the summary results to the city; and
- Provide vehicle data to the Transportation Data Collaborative (TDC) at the University of Washington through an API. Data shall include point location, vehicle identification numbers, vehicle types, fuel level, and engine type (Seattle Department of Transportation, n.d.).

Zoning Policies for Carsharing

Local zoning and codes may have unintended consequences on carsharing success. For example, a zoning ordinance may not permit commercial activity in residential zones (preventing the parking of carsharing in residential neighborhoods). Zoning can also be used to encourage carsharing services and mitigate the parking costs through a strategy known as "incentive zoning."

Zoning Strategies

Incentive zoning consists of an array of policies that cities may implement to ease zoning regulations and parking minimums. Incentive zoning policies can be applied in both new and existing developments. For example, parking substitutions allow developers to substitute general- use parking for shared modes, such as carsharing parking. Additional information and strategies related to zoning can be found in the Shared Mobility and Incentive Zoning Toolkit.

Case Studies

Seattle, WA - Parking Substitution

Seattle's municipal code allows developers to reduce a development project's required total parking up to five percent by providing parking for a city-recognized carsharing program. The ordinance reduces the number of required spaces by one space for every parking space leased by a carsharing program. For developments requiring 20 or more parking spaces, the number of required spaces may be reduced by the lesser of three required parking spaces

for each carsharing space or 15 percent of the total number of required spaces (Seattle Municipal Code, § 23.54.020). To qualify for the 15 percent reduction, the code stipulates that there must be an agreement between the property owner and carsharing operator, and the agreement must be filed and approved by the city and recorded with the deed.

Insurance and Liability Policies

Insurance regulations can make carsharing cost prohibitive. In the early 2000s, North American carsharing operators confronted substantially higher premiums (often more than $2,500 per vehicle). It was also common for providers to carry $1 million (per accident, per claim) single-limit policies (Cohen & Shaheen, 2016). However, insurance is becoming increasingly affordable as the industry grows. Carsharing operators are protected from vicarious liability claims (i.e., they are protected from the negligence of the user to whom the vehicle has been rented).

In some states, insurance laws have not kept pace with the introduction of P2P carsharing models. It may be unclear when a vehicle owner's policy ends and a P2P carsharing operator's commercial policy begins. Some states do not have P2P insurance legislation, and owners may be held liable for loss or injury when their vehicles are used for carsharing. They may also face premium spikes or non-renewal of personal insurance policies (Cohen & Shaheen, 2016).

Insurance Strategies

Revise Insurance Laws. A number of states have enacted laws to create insurance standards and a regulatory framework for P2P carsharing programs. For example, California requires the insurance coverage offered by the P2P carsharing program to be at least three times the minimum requirements for a private vehicle. This law protects participants' insurance policies from being canceled, voided, terminated, rescinded, or nonrenewed solely on the basis that the vehicle has been made available for P2P carsharing.

Taxation Policies

Carsharing services may be subject to state and local taxes that can increase service costs (e.g., rental car taxes). Four types of taxes can be levied on carsharing modes:

- State, county and municipal sales taxes applied to shared mobility (percentage-based tax on sales or receipts from sales),

- Rental car taxes (state and local percentage-based taxes on transaction value of a vehicle rental),
- Transaction fees and per-use excise tax (fixed-rate tax or fee applied to a transaction), and
- Miscellaneous taxes applied to shared mobility (percentage-based or fixed-rate taxes used to fund public transit and special projects).

Municipal governments with the highest tax rates charge between 34.44% and 61.89% on an hourly carsharing reservation. Hourly rentals are often charged a higher tax rate than 24-hour reservations and significantly higher than the average tax rate for other goods and services (Schwieterman, 2017).

Taxation Strategies

To reduce the impact of taxation on carsharing services, municipalities can:

- Amend codes to exempt carsharing from rental car taxes or transaction taxes,
- Revise transaction fees to only occur on annual membership contract (rather than each rental transaction),
- Lower per-use excise taxes, and
- Switch to a tax that is per-hour instead of a flat rate for short-term use.

Equity and Accessibility Policies

Carsharing services can increase accessibility for low-income populations by reducing the expenses associated with vehicle ownership. However, older adults, low-income households, rural communities, and minorities have been less likely to use shared mobility (Tyndall, 2017), and they tend to have lower access to the Internet, smartphones, and banking services. In addition, people with disabilities may face barriers to accessibility, if vehicles do not contain adaptive equipment, such as hand controls or swivel seats, or are not wheelchair accessible.

Strategies to Promote Equity

Strategies to improve equity in carsharing services overlap with those of other shared mobility modes; these strategies include providing low-income subsidies, accessibility to the unbanked and those without smartphones, and developing inclusive services. Strategies to improve equity can be reviewed in depth in the Social Equity Toolkit.

Mobility for People with Disabilities. Cities can require that carsharing operators adopt

measures that enhance accessibility for those with disabilities. Measures can include providing adaptive technology in vehicles or wheelchair accessible vehicles. Cities can also subsidize fares for carsharing services that provide additional services to ensure that rates are equitable for these populations. For example, Zipcar provides the following services for members with disabilities (Zipcar, 2019):

- Installation of hand controls in vehicles with advanced notice of 72 hours. Zipcar will try to accommodate within 48 hours of notice;
- Service animals are exempted from Zipcar's rule of requiring pets in a carrier;
- The $3.50 assistance fee for reservation-related activity is waived for members who self- identify as disabled; and
- Members have an option of a household account, if disabilities prevent them from driving; this allows another person to drive for them.

Case Studies

Los Angeles, CA - Carsharing for Low-Income Residents

The California Air Resources Board partnered with the City of Los Angeles (LA) and the Shared Use Mobility Center to launch a carsharing pilot project aimed at serving low-income residents in LA. The pilot program is funded with $1.6 million in state cap-and-trade revenues and $1.82 million in EV infrastructure rebates, fee waivers, and in-kind support from the City of LA. Goals of the program include: 1) recruiting a minimum of 7,000 new carsharing users, 2) avoiding purchase or sale of 1,000 private vehicles, and 4) reducing GHG emissions by 2,150 metric tons of carbon dioxide (CO2) (Lee, 2016).

In December 2016, the city announced a contract with BlueLA, a subsidiary of Bolloré Group, to run a five-year long electric carsharing program. BlueLA is investing $10 million in a 100-car electric fleet and 200 charging stations. As of April 2019, BlueLA has deployed 80 electric vehicles and 26 charging stations. (Gray, 2019) The vehicles and charging stations are located in disadvantaged neighborhoods throughout Central LA (Ohland, 2016). Currently BlueLA offers three membership plans:

- Standard - Annual membership for $5/month with a usage fee of $0.20/minute. Minimum price per trip is $3.00;
- Community – Annual membership for $1/month with a usage fee of $0.15/minute. Minimum price per trip is $2.25; and
- Trial – Free for one month with a usage fee of $0.40/minute. Minimum price per trip is $6.00.

Key Takeaways

- Carsharing offers members access to vehicles by joining an organization that provides and maintains a fleet of cars and/or light trucks. The carsharing organization typically provides insurance, gasoline, parking, and maintenance. Members who join a carsharing organization typically pay a fee each time they use a vehicle.
- Carsharing encompasses a variety of service models including:
    - Roundtrip - Vehicles are picked-up and returned to the same location.
    - One-Way Station-Based - Vehicles can be dropped off at a different station from the pick-up point.
    - One-Way Free-Floating - Vehicles can be returned anywhere within a specified geographic zone.
- There are four types of carsharing business models:
    - Business-to-consumer (B2C): Individual consumers gain access to a business-owned fleet of vehicles through memberships, subscriptions, user fees, or a combination of pricing models.
    - Business-to-business (B2B): Carsharing providers sell business customers access to transportation services either through a fee-for-service or usage fees.
    - Business-to-government (B2G): Carsharing providers offer transportation services to a public agency. Pricing may include a fee-for service contract, per-transaction basis, or some other pricing model.
    - Peer-to-Peer (P2P): In a P2P model (sometimes referred to as personal vehicle sharing), carsharing providers broker transactions among vehicle owners and guests by providing the organizational resources needed to make the exchange possible.
- Studies have documented that carsharing can reduce vehicle ownership and VMT/VKT, contributing to a reduction in GHG emissions and the use of alternative forms of transportation, such as walking and cycling.
- Public policies, such as allocating rights-of-way for carsharing parking, can be important tools to enhance carsharing access and encourage use.

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