

Measure: Car Sharing Program (T19)

The City of Tucson facilitates establishment of a private (for-profit or non-profit) Car Sharing program beginning in 2012, becoming a “mature” system with 3,600 members by 2015.

Emission reduction potential by 2020:	5,000 tCO ₂ e / yr.
Percentage of goal (2012):	NA
Percentage of goal (2020):	0.2%
Total annual average implementation costs:	<\$25,000 yr for parking signage
Entity that bears the costs of implementation:	City of Tucson
Cost/Savings per tCO ₂ e 2020:	Savings \$3,456 / tCO ₂ e
Net annual savings:	\$17.3 million
Entity that realizes the financial return:	Car Sharing members
Equitability (progressive/regressive, income/revenue neutral, etc):	Progressive – enables lower transportation costs as % of income for lower income citizens
Potential unintended consequences:	Reduction in vehicle expenditures for vehicles and gasoline; slight reduction in public parking space inventory

Background information:

US citizens are accustomed to two forms of vehicle ownership: owning a vehicle, renting a vehicle by the day or week when traveling or temporary personal needs. In the past decade a third option has been developed by for-profit companies in various US and European cities: Car Sharing. Car sharing is rental of a vehicle available within walking distance by the hour, with rental rates structured to incentivize users to rent for 1-4 hours (otherwise, they will possibly pay more than rental for a day from a traditional rental agency).

In a typical car sharing system, a system member (typically paying \$3 - \$10 per month for membership privileges) reserves the car/truck of their choice via internet, walks or otherwise accesses the reserved vehicle, which is parked in a designated parking space only for its use on the street or in a private parking lot such as a shopping center, etc., uses their electronic membership card to unlock the doors (via internet connection) and access the keys inside.

The renter then uses the vehicle for the reserved time (unlimited mileage), returns it to the designated parking space, and relocks the doors. The internet-accessible control system checks the rental in and out, ensuring that only the renter that has reserved the vehicle is able to use it. If the vehicle needs more fuel (i.e. is below $\frac{1}{4}$ tank) the user uses the Car Share company's credit card to refuel it prior to reparking it. Car share companies will employ people to check for vehicle

Typical rental rates are \$6-12/hour during "waking hours" of approximately 8 am to 10 pm; special discounts may be provided for overnight use (example: \$34 overnight in Portland, OR). Rates depend on the costs of the car – small cars will be inexpensive and large vehicles will be expensive.

Similar to cell phone rates, Car Sharing companies offer lower hourly rates to heavy users if the member makes higher monthly payments (Example: a Zipcar member in Portland, OR paying \$25 per month can save \$3-\$4.50/hr on regular rates).¹

The Car Sharing industry began with local start-up companies, and has seen some consolidation amongst city systems moving toward national systems. Hertz, the world's largest rental company, has now entered the industry, starting with special agreements with institutions such as college campuses and military installations to make car sharing available to its stakeholders (college employees/students, military installation users, etc.).

Typical contributions by municipalities to Car Sharing systems are cooperation with establishing designated street parking spaces for the vehicles. No US car sharing system receives direct financial subsidies for its operations, though some industry pioneers received government grants to assist with start-up costs.

Like Bike Sharing, Car Sharing is a critical component of a sustainable mobility system for a region that allows people to achieve their desired mobility without owning a vehicle. Previously, people without owned cars were limited to what transit systems, friends/family, walking, use of an owned bicycle, and an occasional daily vehicle rental could provide.

Adding Car Sharing to this mix provides much greater mobility capability for a person that does not own a vehicle. One result can be increased use of transit, because transit fares are not an additional cost to the monthly cost of vehicle ownership, the vast majority of which are sunk costs in vehicle ownership rather than the marginal cost of vehicle use for a particular trip.

A typical US vehicle owner will pay \$400-700 per month for its ownership, including purchase/depreciation, insurance, maintenance, and fuel, plus pay a productivity penalty for time spent cleaning, maintaining, fueling, purchasing, etc. Most users think only of fuel costs, approximately 10 cents per mile in regular gasoline vehicles, when deciding what mobility system to use for a particular trip instead of the approximately 50 cents per mile that includes all costs.

This marginal cost approach is not entirely irrational since 40 cents are sunk costs that the vehicle owner is paying whether the vehicle is used or not – making vehicle owners much less likely to use transit for particular trips since the slight cost differential of the transit cost from the marginal cost of vehicle fuel doesn't justify the inconvenience of transit.

However, if a person does not own a vehicle, which may be enabled by a Car Sharing system, the combination of Car Sharing membership/use with a transit pass, and possibly Bike Sharing, can save several hundred dollars per month, and promote transit or use of low-emissions vehicles (e.g. bikes, electric bikes, electric scooters, electrically-assisted personal mobility devices, etc.) as a primary rather than secondary mobility choices.

Zipcar, the world's largest car-sharing system, estimates that its members save \$500 per month compared to car ownership.² Chicago's I-GO system estimates that its members save \$5,000 per year.³

It has been estimated that a typical vehicle owner might spend 19 hours working to pay for, purchasing (including watching ads), and maintaining/cleaning their own vehicle for each one hour of use; if the one hour of use covers 60 miles, the overall average speed of the vehicle owner is 20 hours to achieve 60 miles = 3 miles per hour, the speed of walking.⁴ For people who can use personal car-less mobility to meet their needs, substantial time and money savings can result.

Some of the benefits of a for-profit Car Sharing system can be achieved by individuals sharing ownership of a vehicle, reducing the sunk costs each must endure for individual ownership. In most states, this is precluded by insurance laws that allow auto insurance

companies to not cover private vehicles that are cooperatively owned or otherwise “rented” to others.

However, California has addressed this problem through AB1871, which takes effect January 1, 2011, and San Francisco-based non-profit Car Share organizations have already launched a program to facilitate sharing of citizen-owned vehicles.⁵

It has been estimated that the existence of car sharing can reduce the parking spaces required by new residential developments ten percent, while could have indirect effects on Tucson’s greenhouse gas emissions, depending on what the unneeded parking spaces are used for.⁶ The City of Winnipeg recently negotiated inclusion of car sharing in a major residential development because of its multiple benefits to the City’s sustainability goals.⁷

Zipcar, a for-profit US company, is the most successful car sharing system, being responsible for about 50% of car sharing services worldwide and serving 16 North American cities and over 100 university campuses including Arizona State University in the Phoenix area. It estimates that “10% of the US population is expected to adopt car sharing as their primary mode of transportation.”⁸

Car Sharing systems can reduce the greenhouse gas emissions of a region in two primary ways:

- If the system provides more fuel-efficient and less carbon-emitting vehicles than car users would typically provide for themselves as owners, greenhouse gases will be reduced per mile.
- If the existence of the Car Sharing reduces total vehicle use because of monthly cost savings from avoidance of vehicle ownership (as outlined above).

Status Quo / Business as Usual:

Because city governments are partners with Car Sharing companies regarding designated parking spaces on city streets, the minimum action by the City of Tucson is to actively court and then cooperate with a Car Sharing company to establish a city-wide system. If the company believes it will achieve a profitable system in Tucson, the city’s investment will only be the parking signs and other incidental expenses. This is the scenario used in the analysis below (i.e. zero City costs).

If Car Sharing companies do not believe they can earn a profit (or in the case of a non-profit company – break even), the City may consider subsidizing Car Sharing in order to obtain CO2 emissions reductions and the other benefits.

Models for subsidizing are found in the various agreements made by Car Sharing companies with universities where the university will typically guarantee a certain amount of revenue per car (similar to economic development efforts that sometimes will

guarantee an airline a certain amount of revenue if the airline establishes new service to the city that will stimulate business investments or tourism).

Description of Measure and Implementation Scenario:

The City would facilitate development of a mature Car Sharing system with a Car Sharing company by the end of 2015, starting with operations in 2012.

Has the Measure been implemented elsewhere and with what results:

The 16+ cities in North America with city-wide Zipcar systems all have different histories of how the system was developed. Car Sharing companies are becoming more sophisticated and capitalized for rapid roll-outs of systems, especially if they have a foothold in the city via university or other institutional agreements, or in the case of Hertz' "Connect" system existing rental facilities that can serve as cost-effective ancillary services for members.

The industry is rapidly evolving, especially with the entry of Hertz into the industry. Car Sharing memberships increased dramatically in 2008 when gasoline prices spiked, which influenced people to reduce car ownership and mileage traveled when possible.

Energy/Emission analysis:

Greenhouse gas savings from more efficient vehicles:

Car Sharing companies have intentionally used vehicles that are more efficient than the typical mix of US vehicles, both in order to be a greener option for members, and to reduce fuel costs, which the Car Share company pays, relative to rental rates. These factors make it likely that a typical Car Share vehicle will achieve higher MPG and emit less GHGs.

In addition, because of their buying power, Car Share companies are already beginning to incorporate electric vehicles into their fleets with charging stations installed at vehicle locations. Examples include:

- Zipcar partnered with the City of San Francisco in February 2009 on a pilot-project to use PHEVs (retrofitted Toyota Priuses), based upon member surveys showing that 80% of members wanted more Alternative Fueled Vehicles (AFVs) in the car sharing fleet.⁹
- Chicago's I-GO system announced in July, 2010 that it would include 30 electric sedans in its car sharing fleet with charging stations provided through a Chicago Clean Cities Coalition grant by the end of 2011.¹⁰

Greenhouse gas savings from reduced vehicle use:

Zipcar estimates that each of the 6,500 shared vehicles in its fleet reduces the need for 15-20 private-owned vehicles; Chicago’s I-GO system estimates 17 per member for a total of 3,200 since it began in 2002.

Zipcar surveys find that 90% of its members drive 5,500 miles or less per year, saving 219 gallons per year per member, or ~4300 pounds.¹¹ Montreal’s Defi-Climat estimates that a typical car-sharing member will save 1200 kg. CO₂ per year (1.2 tCO₂e).¹²

Total estimated greenhouse gas savings:

Estimates of the total emissions reduction potential of a Tucson Car Sharing system will rely on estimates of the system’s size and the estimates by existing car sharing systems of their GHG impacts. I-GO estimates that its system, 210 vehicles, creates GHG emissions savings of 25,000 tCO₂e/yr. from a combination of reduced driving and more efficient vehicles.

This analysis assumes that a mature city Car Sharing system in the City could be expected to attract 3600 members.¹³ Conservatively estimating that each member would reduce their CO₂ emissions by 3000 pounds per year, the annual savings is estimated to be 5,000 tCO₂e/year starting in 2015.

COT 1990 Citywide GHG emissions (baseline):	5,461,020 tCO ₂ e
MCPA 7% reduction target for COT:	5,078,749
2012 BAU GHG emissions projection:	7,000,000
2020 BAU GHG emissions projection:	7,343,141
GHG emissions reduction to meet 7% goal (2012):	1,921,251
GHG emissions reduction to meet 7% goal (2020):	2,264,392
Contribution of this Measure in 2020:	5,000 tCO ₂ e

Economic analysis:

Measure Costs

Measure costs are estimated to be insignificant, though the City of Tucson will endure some expenses associated with the designation and signing of car share locations on city streets.

Measure Savings

Based on the estimates by Car Sharing companies that its members save ~\$500 per month compared to car ownership, and an assumption that \$100/month of the saved \$500 per month would need to be dedicated to other forms of carless transportation (transit pass or fares, low-impact vehicles, etc.), 3600 Car Sharing members are estimated to save ~\$17.3 million/yr. in transportation-related expenses.

If the program ramps up starting at 900 members in 2012, 1,800 in 2013, 2,700 in 2014 and 3,600 by 2015 through to 2020, estimated cost savings 2012 to 2020 are \$~130 million.

Net Economic Impact

The economic impact on City of Tucson depends on what the Car Sharing members do with their savings, and the local economic multiplier associated with those expenditures. Models concerning what people will do with additional revenues have been shown to often be inaccurate (e.g. people have used tax cuts to save or pay off debt more than projected).

This report therefore assumes that the savings generated by GHG reduction measures have a local multiplier of 1.5, which is a typical multiplier used for economic impacts of new regional income from economic development (new primary jobs).

The economic impacts of the estimated \$17.3 million savings to the Tucson region are therefore estimated as \$26 million/yr.

However, the net impact will be slightly less (theoretically as little as \$0) when the regional impact of the reduced expenditures on transportation is considered. The net impact is not likely to be zero because the local income multiplier for energy expenditures, especially petroleum (since it is not locally produced), is very low, and neither are new cars produced locally, meaning that only a small fraction of expenditure on a new car stays in the local economy.

The net impact is entirely dependent on the specific expenditure choices of the people achieving the transportation-related savings.

Co-benefits:

The co-benefits of a mature regional car sharing system are likely to be the following:

- Reduced driving by Car Sharing members can result in greater income productivity, and reduced healthcare problems/expenses
- Reduced traffic congestion, especially at peak hours, since Car Sharing members are more likely to use carless alternatives for their commutes.
- Reduced air pollution and roadway maintenance costs from reduced auto use.
- Increased numbers of transit customers, helping the financial viability of the region's transit system.
- Net positive economic impacts at little cost to local governments, unless government subsidies are required to support a mature Car Sharing system.
- More rapid increases in the fuel efficiencies of Tucson's light-duty vehicle fleet since Car Sharing companies may increase the use of highly fuel-efficient vehicles faster than the general population.

Equitability:

Car sharing membership requirements are not barriers for lower income people, and reduce transportation expenses compared to owning a vehicle – so car sharing is progressive from an equitability perspective.

Potential unintended consequences:

The unintended consequences of a mature regional car sharing system are likely to be the following:

- Reduction of vehicle sales and car-related purchases at local retailers, resulting in local government revenue losses from registrations.
- Reduction in local/state gasoline taxes or other revenues from vehicle use.
- Slight reduction in public parking inventory due to shared vehicles having dedicated spaces.

Endnotes

¹ Zipcar Portland Member Newsletter, September 2010.

² Zipcar website, “Green Benefits,” accessed Nov. 2010 at: <http://www.zipcar.com/it-it/greenbenefits>.

³ I-GO website, “Company Profile,” accessed Nov. 2010 at: <http://www.igocars.org/about/company-profile>.

⁴ Ivan Illich, *Energy and Equity*, 1970.

⁵ Matthew Roth, “California’s Personal Vehicle Sharing Law Could Diminish Need To Own a Car,” SFStreetsBlog, 30 Sept. 2010, at: <http://sf.streetsblog.org/2010/09/30/californias-personal-vehicle-sharing-law-could-diminish-need-to-own-a-car/>.

⁶ Ian Sacs, New York City Transportation Engineer, “Car Sharing Economies of Scale,” 3 May 2009, at: <http://www.planetizen.com/node/38233>.

⁷ Murray McNeill and Lindsay Wiebe, “City Drives Hard Condo Bargain – Conversion of Village Church Hinges on Car-share Deal,” Winnipeg Free Press, 5 April 2009, at: <http://www.winnipegfreepress.com/business/City-drives-hard-condo-bargain-44292562.html>.

⁸ Zipcar website, “Green Benefits,” accessed Nov. 2010 at: <http://www.zipcar.com/it-it/greenbenefits>.

⁹ Zipcar press release, “zipcar launches plug-in hybrid electric vehicle pilot program in san francisco,” 18 February 2009, at: <http://zipcar.mediaroom.com/index.php?s=43&item=5>.

¹⁰ Jon Hilkevitch, “I-GO to add all-electric cars in 2011,” *Chicago Tribune*, 26 July 2010.

¹¹ Zipcar website, “Green Benefits,” accessed Nov. 2010 at: <http://www.zipcar.com/it-it/greenbenefits>.

¹² Evelyn Reid, “Montreal, Defi-Climat and Global Warming: Fight Global Warming On The Road, About.com at: http://montreal.about.com/od/gettingaroundtown/tp/montreal_defi_climat_cartravel.htm, accessed Nov 2010.

¹³ Car Sharing systems aim for 18 members per vehicle. A mostly mature system in Portland, Oregon has about 250 vehicles. The estimate for Pima County uses 200 vehicles with 18 members per vehicle.