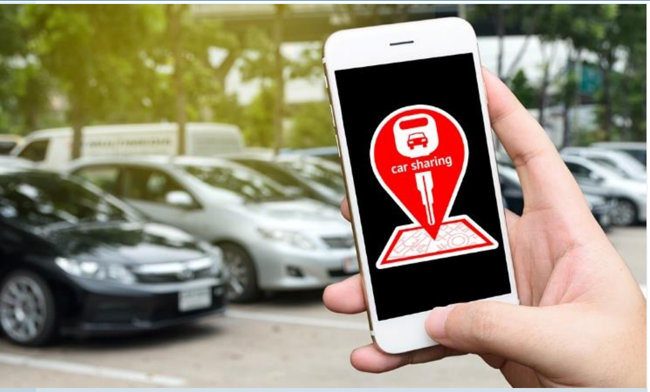
T-21-A. Implement Conventional Carshare Program



GHG Mitigation Potential

0.15%

Up to 0.15% of GHG emissions from vehicle travel in the plan/community

Co-Benefits (icon key on pg. 34)

Climate Resilience

Carshare programs can increase accessibility and provide redundancy to vehicles that can be used to evacuate or obtain resources during an extreme weather event. Carshare programs can allow residents to give up or avoid car ownership, leading to cost savings that can help build economic resilience.

Health and Equity Considerations

Provide inclusive mechanisms so people without bank accounts, credit cards, or smart phones can access the system.

Measure Description

This measure will increase carshare access in the user's community by deploying conventional carshare vehicles. Carsharing offers people convenient access to a vehicle for personal or commuting purposes. This helps encourage transportation alternatives and reduces vehicle ownership, thereby avoiding VMT and associated GHG emissions. A variation of this measure, electric carsharing, is described in Measure T-21-B, *Implement Electric Carshare Program*.

Subsector

Neighborhood Design

Locational Context

Urban, suburban

Scale of Application

Plan/Community

Implementation Requirements

The GHG mitigation potential is based, in part, on literature analyzing one-way carsharing service with a free-floating operational model. This measure should be applied with caution if using a different form of carsharing (e.g., roundtrip, peer-to-peer, fractional).

Cost Considerations

The costs incurred by the carshare program service manager (typically a municipality or carshare company) may include the capital costs of purchasing vehicles; costs of storing, maintaining, and replacing the fleet; and costs for marketing and administration. Some of these costs may be offset by income generated through program use.

Expanded Mitigation Options

When implementing a carshare program, best practice is to discount carshare membership and provide priority parking for carshare vehicles to encourage use of the service.

GHG Reduction Formula

$$A = \frac{B \times (E - D)}{C}$$

GHG Calculation Variables

ID	Variable	Value	Unit	Source
Output				
A	Percent reduction in GHG emissions from vehicle travel in plan/community	0–0.15	%	calculated
User Inputs				
B	Number of vehicles deployed in plan/community	[ ]	integer	user input
C	VMT in plan/community without measure	[ ]	VMT per day	user input
Constants, Assumptions, and Available Defaults				
D	Conventional VMT avoided with measure	68.2	VMT per day per vehicle	Martin and Shaheen 2016
E	Conventional VMT added with measure	24.4	VMT per day per vehicle	Martin and Shaheen 2016

Further explanation of key variables:

- (B) – The number of cars in the carshare program is selected by the carshare provider, but its magnitude is relative to the size of the service area. A study of several carsharing programs (Martin and Shaheen 2016) documented a range of carshare fleet sizes for different North American cities: Calgary (590), San Diego (406), Seattle (640), Vancouver (920), Washington, D.C. (626).
- (C) – The total plan/community VMT should represent the expected total VMT generated by all land use in that area. The most appropriate source for this data is from a local travel demand model.
- (D) – Conventional VMT avoided per deployed carshare vehicle was derived based on a study of conventional-engine based car share programs in Calgary, Seattle, Vancouver, and Washington, D.C. It accounts for VMT avoided from carshare users who sold their personal vehicles and carshare users who decided not to purchase a personal vehicle, both directly because of the availability of carshare (Martin and Shaheen 2016).
- (E) – Conventional VMT added per deployed carshare vehicle was derived based on a study of conventional-engine based car share programs in Calgary, Seattle, Vancouver, and Washington, D.C. It accounts for the VMT of the carshare vehicles (Martin and Shaheen 2016).

GHG Calculation Caps or Maximums

Measure Maximum

(A_{max}) The maximum GHG reduction from this measure is 0.15 percent. This maximum scenario is presented in the below example quantification.

Subsector Maximum

($\sum A_{max_{T\text{-}18\text{ through }T\text{-}22\text{-}C}} \leq 10\%$) This measure is in the Neighborhood Design subsector. This subcategory includes Measures T-18 through T-22-C. The VMT reduction from the combined implementation of all measures within this subsector is capped at 10 percent.

Example GHG Reduction Quantification

The user reduces plan/community VMT by deploying carshare vehicles. In this example, the project would be in the city of San Diego, which in 2017 had a VMT per day of 24,101,089 miles (C) (SANDAG 2019). Assuming twice the number of vehicles used in the Car2go San Diego program (B), the GHG emissions from plan/community VMT would be reduced by 0.15 percent.

$$A = \frac{\textbf{812 vehicles} \times (24.4\ \frac{\text{VMT}}{\text{day}\cdot\text{vehicle}} - 68.2\ \frac{\text{VMT}}{\text{day}\cdot\text{vehicle}})}{\textbf{24,101,089}\ \frac{\textbf{VMT}}{\textbf{day}}} = \text{-}0.15\%$$

Quantified Co-Benefits

Improved Local Air Quality

The percent reduction in GHG emissions (A) would be the same as the percent reduction in NO_X, CO, NO_2, SO_2, and PM. Reductions in ROG emissions can be calculated by multiplying the percent reduction in GHG emissions (A) by an adjustment factor of 87 percent. See *Adjusting VMT Reductions to Emission Reductions* above for further discussion.

Energy and Fuel Savings

The percent reduction in vehicle fuel consumption would be the same as the percent reduction in GHG emissions (A).

VMT Reductions

The percent reduction in VMT would be the same as the percent reduction in GHG emissions (A).

Sources

- Martin, E. and S. Shaheen. 2016. *The Impacts of Car2go on Vehicle Ownership, Modal Shift, Vehicle Miles Traveled, and Greenhouse Gas Emissions: An Analysis of Five North American Cities.* July. Available: https://tsrc.berkeley.edu/publications/impacts-car2go-vehicle-ownership-modal-shift-vehicle-miles-traveled-and-greenhouse-gas. Accessed: March 2021.
- San Diego Association of Governments (SANDAG). 2019. *Mobility Management VMT Reduction Calculator Tool – Design Document.* June. Available: https://www.icommutesd.com/docs/default-source/planning/tool-design-document_final_7-17-19.pdf?sfvrsn=ec39eb3b_2. Accessed: January 2021.