

UC Berkeley

Recent Work

Title

Ridesharing (Carpooling and Vanpooling)

Permalink

<https://escholarship.org/uc/item/1k3152cx>

Authors

Shaheen, Susan, PhD

Cohen, Adam

Randolph, Michael

et al.

Publication Date

2019-12-01

DOI

10.7922/G26971T3

Ridesharing (Carpooling and Vanpooling)

Susan Shaheen, Ph.D., Adam Cohen, Michael Randolph,
Emily Farrar, Richard Davis, Aqshems Nichols

A subsection of the Shared Mobility Policy Playbook
(DOI: 10.7922/G2QC01RW)

DOI: 10.7922/G26971T3



RIDESHARING

Ridesharing allows travelers to share a ride to a common destination and can include several forms (Shaheen & Cohen, 2019; Chan & Shaheen, 2011; SAE International, 2018). Ridesharing differs from for-hire vehicle services (i.e., transportation network companies (TNCs), ridesourcing, and ridehailing) in its financial motivation. When a ridesharing payment is collected, it partially covers the driver's cost and is not intended to result in financial gain. Additionally, the driver has a common origin and/or destination with the passengers. Types of ridesharing include:

- **Casual Carpooling**, also known as “slugging” and “flexible carpooling,” is a form of ad hoc, informal carpooling among strangers. Typically, no money exchanges hands or passengers pay a nominal amount to reimburse drivers for actual travel expenses (i.e., tolls, gas, etc.). In some regions, cities may designate casual carpooling locations where drivers can pick up passengers waiting for a shared ride.
- **Real-Time Carpooling**, also known as “app-based carpooling” and “dynamic carpooling,” allows people to arrange ad hoc rides on-demand (or very short notice) using smartphone apps or a website. Typically, passengers are picked up at their current location or a mutually agreed upon pick-up location.
- **Vanpooling** typically consists of 7 to 15 passengers who share the cost of a van and may share driving responsibility.



*Figure 5.1. Sign for a dedicated carpool lane.
Photo Courtesy of Flickr/user lady madonna*

In this toolkit, readers will find a summary of the social, environmental, and behavioral

impacts of ridesharing as well as a summary of user benefits. Following this material is an in-depth exploration of policy considerations for ridesharing that includes: incentive zoning, public-private partnerships, parking policies, road and curb pricing, ridesharing infrastructure, and tax incentives. Case studies of policies implemented for ridesharing are provided throughout the text.

Impacts of Ridesharing

A number of social, environmental, and behavioral impacts have been attributed to ridesharing, and an increasing body of empirical evidence supports many of these relationships, although more research is needed—as ridesharing is difficult for researchers to observe and record. Empirical and anecdotal evidence indicates that ridesharing provides numerous societal benefits.

Reduced Vehicle Miles Traveled (VMT) - Studies have shown that programs that encourage



ridesharing can reduce VMT or vehicle kilometers traveled (VKT). For example, one study estimates that these programs can reduce VMT for workplace commutes by four percent to six percent (Boarnet et. al., 2014). While ridesharing has typically been associated with decreased VMT, it is important to note that ridesharing could lead to induced demand due to reduced travel times and costs. This should be considered in the net VMT impacts of any ridesharing policy.

Reduced Fuel Consumption - Ridesharing can be an effective strategy to reduce energy



consumption (Noland, Cowart, & Fulton, 2006). For example, a study of ridesharing in the San Francisco Bay Area estimates an annual reduction between 450,000 and 900,000 gallons of gasoline. The majority of these savings are attributable to congestion reduction (Minett & Pearce, 2011).

Reduced Greenhouse Gas (GHG) Emissions - Studies have found that ridesharing can



reduce GHG emissions by reducing fuel consumption. One study forecasts that individually carpoolers reduce personal commute GHG emissions by approximately four to five percent after joining an employer trip reduction program (Herzog, Bricka, Audette, & Rockwell, 2006).

Reduced Traffic-Related Emissions for Low-Income and Minority Households - Low-



income and minority households commonly bear disproportionate exposure to vehicular emissions along congested roadways. Approximately four percent of Americans (11.3 million people) live within 500 feet of a major highway. Research indicates that certain populations (e.g., members of minority communities, foreign-born persons, and persons who speak a non-English language at home) are likely to be at a higher risk for exposure to traffic-related air pollution as a result of residential proximity to major highways. As such, ridesharing can serve as one primary prevention strategy to reduce traffic-related emissions to these communities.

Cost Savings for Public Agencies and Employers - By improving infrastructure capacity and



person throughput, carpooling is a cost-effective strategy to mitigate congestion and reduce the need for additional roadway and public transit capacity. In Seattle, a Commute Trip Reduction Ordinance has contributed to an 11 percent reduction in single-occupant vehicle trips (City of Seattle, 2017). Another study found that casual carpooling has the potential to notably reduce energy consumption for 150 commuters equivalent to providing an express bus service for the same number of commuters but at a lower cost (Dorinson et al., 2009).

Reduced Need for Parking - By reducing the number of vehicle trips, public and private



sector employees can reduce parking demand thereby saving capital costs of \$15,000 to \$45,000 per parking space (depending on design and land availability) and operational costs of approximately \$360 to \$2,000 annually per parking space (Shoup, 2011; Environmental Protection Agency, 2005).

Individual Benefits & Ridesharing Motivators

Ridesharing is a flexible commuting solution that yields a wide array of benefits and options for users.

- **Enhancing Accessibility and Economic Opportunity-** Long commutes and limited job access via public transportation can leave many jobs out of reach for carless

households. Ridesharing may serve an important role in enhancing mobility in low-income, immigrant, and nonwhite communities where travelers are more likely to be unable to afford personal automobiles and obtain drivers' licenses (Liu & Painter, 2012).

- **Travel Time and Cost Savings** - Ridesharing can offer users cost and travel time savings through toll discounts, reduced wait times at toll plazas, and high occupancy vehicle (HOV) lane access.
- **Convenience** - Commuters who participate in ridesharing frequently have access to preferential parking and HOV lanes that contribute to ridesharing's convenience.

Policy Considerations for Ridesharing

A variety of stakeholders play crucial roles in supporting people who use ridesharing, ranging from specific programs at the employer and local government level to broader policy support at the state and federal levels of government. Local and regional support for people who use ridesharing can also include establishing travel demand management (TDM) or trip reduction ordinances.

These policies offer a complex combination of approaches to reduce single occupant vehicle trips, while also encouraging the inclusion of people who use ridesharing into residential, commercial, and mixed-use projects. Air quality districts that were failing to meet federal standards began implementing trip reduction and TDM policies in the 1980s, and they have continued to revise and implement new programs (see Table 5.1 below). Broadly, policy considerations for ridesharing typically include:

- Incentive Zoning,
- Public-Private Partnerships,
- Parking Policies,
- Road and Curb Pricing,
- Ridesharing Infrastructure and HOV Priority, and
- Tax Incentives.

Table 5.1 Examples of Transportation Demand Management Strategies in the U.S.

Jurisdiction	Key Policy Components	Application
Bellevue, WA	Earned incentives and lotteries	Commuters can earn coupons and enter drawings for additional rewards.
Indianapolis, IN	Minimum parking reductions for developers for the inclusion of carpooling and other infrastructure supportive of alternative modes	Developers can earn a 35% cumulative minimum parking reduction for the inclusion of TDM measures, such as carpooling parking.
Maricopa County, AZ	Mandated employer commute trip reduction program	Employers with 50 or more employees are required to implement trip reduction measures such as: ridematching, carpooling subsidies, and preferential parking for carpooling.
Pima County, AZ	Mandated employer commute trip reduction program	Employers with 100 or more employees are required to implement trip reduction measures such as: ridematching, carpooling subsidies, and preferential parking for carpooling.
Redmond, WA	Lotteries	Commuters taking alternative modes can enter a lottery for gift cards.
Seattle, WA	Mandated employer commute trip reduction program	Employers with 100 or more employees are required to implement trip reduction measures such as: ridematching, carpooling subsidies, and preferential parking for carpooling.
South Coast Air Quality Management District (SCAQMD)	Average vehicle ridership (AVR)	Worksites with 250 or more employees must implement an annual commute trip reduction program that achieves an average vehicle ridership performance requirement of 1.3 to 1.75 depending on the geographic zone.
Sunnyvale, CA	Required transportation demand management (TDM) program for multifamily residential developments	TDM programs are required of all new developments of 10 or more residential units. Each development must achieve a certain number of points to receive approval. Points earned vary by TDM strategies including: site design options (proximity to public transit, development density, affordable housing) and ongoing TDM techniques (bike and pedestrian pathways, public transit pass programs, bike lockers) (City of Sunnyvale, 2016).

Source: (Shaheen, Cohen, & Bayen, 2018)

Seattle, WA Metro Area - Commute Trip Reduction Ordinance

Seattle's Municipal Code requires that employers implement at least two trip reduction programs, which can include ridematching services for employees, subsidies for carpool participation, and preferential parking and reduced parking fees for carpool and vanpool vehicles. The Seattle Department of Transportation (SDOT) estimates around 250 employers with over 187,758 daily commuters participate in the city's trip reduction program. SDOT estimates that the drive alone rate for the city has fallen from 39% in 2007/2008 to 34% in 2015/2016 (City of Seattle, 2017; Seattle Department of Transportation, 2017).

A number of other Washington municipalities have implemented trip reduction programs, including some paired with monetary incentives. The City of Redmond offers a monthly gift card lottery for people taking alternative modes at least four days per month. The City of Bellevue offers a benefits program where commuters can earn monthly coupons to local retailers and be entered into a monthly gift card drawing.

Statewide Trip Reduction Laws

Similar to local trip reduction ordinances, states can pass legislation or issue regulatory mandates requiring commute trip reduction benchmarks (see Table 5.2 below).

Table 5.2 Examples of Statewide Trip Reduction Laws in the U.S.

State	Requirements	Applications
Arizona	<p>Major employers must provide employees with information on alternative commute options, participate in a mode choice and VMT survey, designate a transportation coordinator, and implement trip reduction measures such as:</p> <ul style="list-style-type: none"> • providing ridematching and vanpooling services, • subsidizing carpooling and vanpooling, • allowing the usage of company vehicles for carpooling, and • offering preferential parking for carpooling among other applicable measures. 	<p>All major employers with 100 or more full-time employees (50 or more employees in select areas) working at or reporting to a single work site during any 24-hour period for at least three days per week during at least six months of the year</p>
Massachusetts	<p>Facilities must offer carpool matching using a designated coordinator or carpool-matching service and set aside preferential spaces for carpools.</p>	<p>Businesses that employ 250 or more daytime employees and educational institutions with 1,000 or more applicable commuters</p>
Oregon	<p>Employers must offer commute options to employees designed to reduce single occupant vehicle commute trips; incentives must have the potential to reduce commute trips by 10% from an established baseline.</p>	<p>Employers with 100 or more employees at a single worksite</p>
Washington	<p>Employers must develop their own trip reduction plans and submit them for approval.</p>	<p>All employers with 100 or more full-time employees at a single worksite with a scheduled start between 6 to 9AM on weekdays; employers located in urban growth areas or counties with populations exceeding 150,000</p>

Source: (Shaheen et. al., 2018)

Incentive Zoning

In addition to mandating trip reduction, local and regional governments can integrate provisions within building codes to encourage carpooling. For example, the city of Indianapolis revised its zoning and subdivisions ordinance in 2016 to permit developers a cumulative reduction in required parking up to 35 percent for the inclusion of TDM measures. One of the measures that helped developers qualify for this parking reduction is the inclusion of carpool and vanpool parking spaces. Indianapolis allows developers to reduce off-street parking by four spaces for each carpooling parking spot developed, and the city also allows each carpool parking spot to count toward the minimum number of required spaces (City of Indianapolis, 2018) (Please see the Shared Mobility and Incentive Zoning Toolkit for more information).

Public-Private Partnerships

San Diego, CA - San Diego Association of Government's (SANDAG) iCommute Program

TDM is a key component of the San Diego 2050 Regional Transportation Plan (2050 RTP). SANDAG's TDM efforts are branded as iCommute (www.iCommuteSD.com) and are managed as part of the regional 511 transportation information program. iCommute provides a regional vanpool program, public transit support, bicycle encouragement programs, a Guaranteed Ride Home program, SchoolPool, and ridematching through private-sector technology partnerships. iCommute provides a comprehensive Commuter Benefit Program Starter Kit that outlines a simple, three-step process to help employers identify their commute needs, design a custom program, and roll it out to their employees. iCommute staff are available to work one-on-one with employers to survey employees, map employee commute routes, and develop custom TDM plans that makes business sense. SANDAG has provided free ridematching services with a variety of vendors continuously since the 1980s. From 2015 to 2018, iCommute provided a free ridematching service using RideAmigos at an annual cost of approximately \$50,000 to SANDAG. SANDAG terminated its contract with RideAmigos (which provides more than just ridematching) because the system saw low and declining usage. Through SANDAG's in-person carpool outreach events, staff found that customers expect to have access to an on-demand app that they can download to find a

carpool.

iCommute partnered with Uber and Lyft during the Rideshare Corporate Challenge 2016 to offer discounted and free pooled rides (UberPOOL and Lyft Line (now Lyft Shared rides) or pooled TNC rides, known as ridesplitting) to employees during designated time periods. The Guaranteed Ride Home program, a partnership between SANDAG and Uber, provides enrollees a free trip home up to three times per year in the event of emergency. Uber plans to subsidize this program up to \$20,000 annually through 2022.

In 2017, SANDAG issued a request for a technology partner to provide on-demand carpooling through an app, leading to a partnership with Waze Carpool. SANDAG has received mostly positive feedback since the transition to Waze. Waze provided its own funding for carpool incentives (\$2.00 per driver from February through April 2018), marketing, and promotion. This pilot program provided an incentive of 10 free trips over a 90-day period through the Waze Carpool app. New carpool drivers that participate are rewarded with a \$50 gift card. In addition to their carpooling partnership, SANDAG is launching a vanpool pilot in partnership with Waze to help fill open vanpool seats using their application (Shaheen & Cohen, 2018).



Figure 5.2. A shared ride in a vehicle. Photo Courtesy of Unsplash/David Emrich

Parking

In most U.S. cities, parking is typically free. The oversupply of free parking can distort the transportation marketplace and modal choice. Employer parking policies can help employees shift preferences toward ridesharing such as:

- **100 percent commuter choice** involves employers providing all employees an equal tax-free transportation allowance equal to or less than what an employer charges for parking. If a commuter needs to drive alone to work, they use the 100 percent commuter choice allowance provided by the employer to pay for parking. Other employees might choose to move closer to work, walk, use public transit, cycle, carpool, or vanpool to work (Lew Pratsch, unpublished paper, 2017).
- **Parking Cash Out** is an employer-funded program where employees are offered a cash allowance equivalent to the parking subsidy that an employer would otherwise pay to provide the employee with a parking space. Parking cash-out programs can also be implemented through mandates by local or state governments. Parking cash outs make the true cost of parking more transparent to drivers and can encourage commuters that drive to work alone and park for free to use ridesharing.

Road and Curb Pricing

Road and curb pricing are also strategies that can encourage higher occupancy modes (Forscher & Shaheen, 2018). Road and curb pricing are direct charges that are levied for the use of roads and curb frontage such as: road tolls, distance or time-based fees, congestion charges, and fees. These charges are designed to discourage certain vehicles or behaviors, including higher polluting vehicles and lower occupancy vehicles, respectively. In the context of pooling, pricing can be applied to discourage single occupant vehicle travel. Refer to the Shared Mobility and Pricing Toolkit for more information.

San Francisco Bay Area Toll Authority

In the San Francisco Bay Area, the Bay Area Toll Authority is responsible for administering regional bridge tolls and provides discounts for carpools during commute times. Toll discounts for carpools vary from approximately 30 percent to 60 percent

depending on the bridge and if electronic toll collection is used (Bay Area Toll Authority, 2019). The Toll Authority’s toll pricing as of March 2019 is displayed in Table 5.3 below.

Table 5.3 Bay Area Toll Authority Rates for Single-Occupant and Carpool Vehicles					
Bridge	Toll Rates During Commute Times		Carpool Requirement	Commute Hours Monday to Friday	
	Regular	Carpool		Morning	Afternoon
Golden Gate <i>Regular Toll with FasTrak</i>	\$8.20 \$7.35	\$5.35	3 or more people, FasTrak required	5 to 9 am	4 to 6 pm
San Francisco Oakland Bay	\$7.00	\$3.00		5 to 10 am	3 to 7 pm
Antioch	\$6.00				
Benicia - Martinez					
Carquinez					
Richmond - San Rafael					
Dumbarton	Two or more people, FasTrak required				
San Mateo - Hayward					

Source: (Bay Area Toll Authority, 2019)

Ridesharing Infrastructure and HOV Priority

A number of ridesharing infrastructure and priority policies can be implemented individually or collectively to provide priority to HOVs, such as carpools and vanpools. Ridesharing infrastructure typically includes:

- **HOV highway and arterial lanes** that provide carpools and vanpools a network of HOV lanes on highways and high-volume corridors and surface streets, and
- **Park-and-ride facilities** that provide parking for travelers to leave their vehicles and transfer to a carpool, vanpool, or public transportation for the remainder of

their journey.

HOV Lanes - The availability of HOV lanes is critical to supporting ridesharing. Studies indicate that HOV lanes can reduce vehicle trips by four percent to 30 percent. HOV lanes are most effective at reducing single occupant vehicle use on congested highways to large employment centers in large urban areas with high frequency bus service during peak periods, where public transit provides time savings of at least five to 10 minutes per trip (Turnbull, Levinson, Pratt, & Bhatt, 2006). Best practices for implementing effective HOV facilities include:

- A minimum threshold of approximately one million people in a metropolitan region;
- High levels of traffic congestion along a corridor;
- Access to an employment center with more than 100,000 workers;
- Supportive TDM programs and policies with ongoing marketing;
- Visible HOV or automated HOV enforcement; and
- Institutional, local, and regional support for ridesharing.

HOV lanes can be implemented by adding new road capacity designated for HOVs or converting an existing lane to HOV use. HOV lanes have a number of varying design and operational characteristics such as:

- Separation from regular traffic using signs, markings, painted buffers, or physical barriers; and
- Operational hours varying from peak hours only to 24 hours. Some facilities may use reversible lanes for areas with high levels of directional traffic.

Park-and-Ride Facilities - Park-and-ride facilities are parking lots, typically located in the suburbs or outskirts of metropolitan areas, that allow commuters to park their vehicles and participate in ridesharing or take public transit to their destination (Turnbull, Pratt, & Levinson, 2004). The average park-and-ride typically contains between 30 and 250 parking spaces, and some larger facilities can have more than 2,000 parking spaces. While research on the impacts of park-and-ride lots is limited, anecdotal evidence indicates that these facilities support ridesharing because they provide a safe and convenient meeting location for travelers to form a match. Additionally, these facilities can shift parking and congestion out of existing urban areas to lower density, less congested areas (Turnbull et al., 2004; Victoria Transport Policy Institute, 2014).

Other Ridesharing Infrastructure Policies- In addition to HOV lanes and park-and-ride facilities, a number of policies can encourage ridesharing through travel time savings. These policies include:

- Queue jumping where HOV lanes can by-pass ramp meters and enter immediately while SOV lanes must use the meters,
- Signal prioritization for HOV lanes on surface streets, and
- Preferential parking or parking discounts for ridesharing vehicles.

Each of these policies can help reduce travel times for HOVs. HOV priority effectiveness will typically depend on maintaining notable travel time savings over single occupant vehicle trips. As such, this policy should target corridors with congested general-purpose lanes where maximum travel time savings may be achieved (Victoria Transport Policy Institute 2014).

Tax Incentives and Commuter Tax Benefits

Tax incentives and commuter tax benefits provide a way for employers to provide parking, public transit, vanpool, and bicycle expenses on a tax-free basis. This can be done on a pre-tax basis, through employer subsidies, or both of these approaches (Section 132(f) U.S. Internal Revenue Code).

- With pre-tax public transit benefits, employees can elect to withhold funding from their paycheck. Those funds are used to purchase fares for public transit or vanpools. The employee is not taxed on the funding withheld, and the employer does not pay employment taxes on those funds.
- Through subsidies, employers can provide public transit or vanpool fares in addition to salary. With subsidies, the employee is not taxed on the value of these funds nor does the employer pay employment taxes on those funds.
- Employers can subsidize a portion of an employee's commute expenses, and the employee can withhold an additional amount based on need on a pre-tax basis (Internal Revenue Service, 2019).

Previously, employers could deduct the subsidy portion of a commuter's expenses that were paid for by the employer; however, this tax benefit was eliminated with the passage of the Tax Cuts and Jobs Act of 2017. While employers can still subsidize these expenses, they can no longer deduct the subsidized portion of their commuters'

expenses. A number of states have implemented tax incentives and commuter tax benefits. See Table 5.4 below for examples.

Table 5.4 State Tax Incentive and Commuter Tax Benefits		
State	Incentive Beneficiary	Incentive Amount
Maryland	Employer	50% of the eligible costs of providing commuter benefits to employees
Georgia	Employer	\$25 for each employee using a federal qualified transportation fringe benefit at least 10 days per month
Washington	Employer and Property Managers	\$60 per employee per a year, up to \$100,000 per an employer/property manager annually

Source: (Shaheen et al., 2018)

Key Takeaways

- Ridesharing allows travelers to share a ride to a common destination and can include several forms of sharing a ride, such as casual carpooling, real-time carpooling, and vanpooling.
- Ridesharing provides a variety of social, environmental, and behavioral benefits that governments leverage through policies that encourage pooling.
- Users can benefit from ridesharing through increased convenience, enhanced accessibility, and cost savings.
- Local and regional governments can support ridesharing by implementing parking reforms, incentive zoning, pricing strategies, TDM ordinances, and infrastructure (e.g., HOV lanes and park-and-ride facilities).
- State governments can also support ridesharing through tax incentives and state transportation demand management laws.

RECOMMENDED READING

Boarnet, M., Hsu, H.-P., & Handy, S. (2014). *Policy Brief: Impacts of Employer-Based Trip Reduction Programs and Vanpools on Passenger Vehicle Use and Greenhouse Gas Emissions* (pp. 1-8). Retrieved from California Air Resources Board website: https://ww3.arb.ca.gov/cc/sb375/policies/ebtr/ebtr_brief.pdf

Environmental Protection Agency. (2005). *Carpool Incentive Programs: Implementing Commuter Benefits as One of the Nation's Best Workplaces for Commuters* (pp. 1-19). Retrieved from United States Environmental Protection Agency website: https://www.bestworkplaces.org/pdf/carpool_June07.pdf

Global e-Sustainability Initiative. (2008). *SMART 2020: Enabling the low carbon economy in the information age* (pp. 1-87). Retrieved from The Climate Group website: <https://www.theclimategroup.org/sites/default/files/archive/files/Smart2020Report.pdf>

Kneebone, E. (2009). *Job Sprawl Revisited: The Changing Geography of Metropolitan Employment* (pp. 1-24). Retrieved from Metropolitan Policy Program at Brookings website: <https://www.brookings.edu/research/job-sprawl-revisited-the-changing-geography-of-metropolitan-employment/>

Pratsch, L. (1974). CARPOOLS: The Underutilized Resource. *Civil Engineering*, 44(1). Retrieved from <https://trid.trb.org/view/140499>

Shaheen, S., & Cohen, A. (2019). Shared ride services in North America: Definitions, Impacts, and the Future of Pooling. *Transport Reviews*, 39(4), 427-442. <https://doi.org/10.1080/01441647.2018.1497728>

Shaheen, S., Cohen, A., & Bayen, A. (2018). *The Benefits of Carpooling* (pp. 1-34). Retrieved from <https://escholarship.org/uc/item/7jx6z631>

REFERENCES

- Bay Area Toll Authority. (2019). Using Carpool Lanes. Retrieved July 24, 2019, from <https://www.bayareafastrak.org/en/howitworks/carpool.shtml>
- Boarnet, M., Hsu, H.-P., & Handy, S. (2014). *Policy Brief: Impacts of Employer-Based Trip Reduction Programs and Vanpools on Passenger Vehicle Use and Greenhouse Gas Emissions* (pp. 1-8). Retrieved from California Air Resources Board website: https://ww3.arb.ca.gov/cc/sb375/policies/ebtr/ebtr_brief.pdf
- Chan, N. D., & Shaheen, S. A. (2011). Ridesharing in North America: Past, Present, and Future. *Transport Reviews*, 32(1), 93-112. <https://doi.org/10.1080/01441647.2011.621557>
- City of Indianapolis. (2018, May 21). Zoning and Subdivision Ordinance (Indy Rezone). Retrieved July 24, 2019, from Indy.gov website: <https://www.indy.gov/activity/zoning-and-subdivision-ordinance-indy-rezone>
- City of Seattle. (2007). *Commute Trip Reduction Basic Information* (pp. 1-20). Retrieved from Seattle Department of Transportation website: https://commuteseattle.com/wp-content/uploads/2017/03/CSToolkit_TBT_Ch1.pdf
- City of Sunnyvale. (2016). *Transportation Demand Management (TDM) Programs*. Retrieved from County of Santa Clara website: <https://www.sccgov.org/sites/phd/collab/tscn/Documents/tscn-amcospres.pdf>
- Dorinson, D., Gay, D., Minett, P., & Shaheen, S. (2009). *Flexible Carpooling: Exploratory Study* (pp. 1-83). Retrieved from UC Davis, Institute of Transportation Studies website: <https://escholarship.org/uc/item/5fk84617>
- Environmental Protection Agency. (2005). *Carpool Incentive Programs: Implementing Commuter Benefits as One of the Nation's Best Workplaces for Commuters* (pp. 1-19). Retrieved from United States Environmental Protection Agency website: https://www.bestworkplaces.org/pdf/carpool_June07.pdf
- Forscher, T., & Shaheen, S. (2018). Pooling Passengers and Services. *ITS Berkeley Policy Briefs, 2018(07)*. <https://doi.org/10.7922/G2Q52MS2>

- Herzog, E., Bricka, S., Audette, L., & Rockwell, J. (2006). Do Employee Commuter Benefits Reduce Vehicle Emissions and Fuel Consumption?: Results of Fall 2004 Survey of Best Workplaces for Commuters. *Transportation Research Record: Journal of the Transportation Research Board*, 1956(1), 34-41. <https://doi.org/10.1177/0361198106195600105>
- Internal Revenue Service. (2019). *Employer's Tax Guide to Fringe Benefits* (pp. 1-33). Retrieved from Department of the Treasury, Internal Revenue Service website: <https://www.irs.gov/pub/irs-pdf/p15b.pdf>
- Liu, C. Y., & Painter, G. (2012). Travel Behavior among Latino Immigrants: The Role of Ethnic Concentration and Ethnic Employment. *Journal of Planning Education and Research*, 32(1), 62-80. <https://doi.org/10.1177/0739456X11422070>
- Minett, P., & Pearce, J. (2011). Estimating the Energy Consumption Impact of Casual Carpooling. *Energies*, 4(1), 126-139. <https://doi.org/10.3390/en4010126>
- Noland, R. B., Cowart, W. A., & Fulton, L. M. (2006). Travel demand policies for saving oil during a supply emergency. *Energy Policy*, 34(17), 2994-3005.
- SAE International. (2018). *Taxonomy and Definitions for Terms Related to Shared Mobility and Enabling Technologies* (pp. 1-13). https://doi.org/10.4271/J3163_201809
- Seattle Department of Transportation. (2017). *Commute Trip Reduction Alternate Plan: 4-Year Report* (pp. 1-15). Retrieved from Seattle Department of Transportation website: https://www.seattle.gov/Documents/Departments/SDOT/TransportationOptionsProgram/Seattle_4yrPilotEval_final.pdf
- Shaheen, S., & Cohen, A. (2019). Shared ride services in North America: Definitions, Impacts, and the Future of Pooling. *Transport Reviews*, 39(4), 427-442. <https://doi.org/10.1080/01441647.2018.1497728>
- Shaheen, S., Cohen, A., & Bayen, A. (2018). *The Benefits of Carpooling* (pp. 1-34). Retrieved from <https://escholarship.org/uc/item/7jx6z631>

Shoup, D. C. (2011). *The high cost of free parking* (Updated). Chicago: Planners Press, American Planning Association.

Turnbull, K., Levinson, H., Pratt, R., IV, J. E., & Bhatt, K. (2006). *HOV Facilities: Traveler Response to Transportation System Changes* (No. Report 95: Chapter 2). Retrieved from Transit Cooperative Research Program (TCRP) website: <https://www.worldtransitresearch.info/research/3047>

Turnbull, K., Pratt, R., IV, J. E., & Levinson, H. (2004). *Park-and-Ride/Pool: Traveler Response to Transportation System Changes* (No. Report 95: Chapter 3). Retrieved from Transit Cooperative Research Program (TCRP) website: <https://www.worldtransitresearch.info/research/3048>

Victoria Transport Policy Institute. (2014). Park & Ride: Convenient Parking For Transit Users. In *TDM Encyclopedia*. Retrieved from <https://www.vtpi.org/tdm/tdm27.htm>