

# Feasibility of an Electric Car-Sharing Service in a Suburban Environment: Team Best Practices



**Fall 2022**

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The project on which this presentation is based was completed in collaboration with the City of Edina as part of a 2022–2023 Resilient Communities Project (RCP) partnership. RCP is a program at the University of Minnesota’s Center for Urban and Regional Affairs (CURA) that connects University faculty and students with local government agencies in Minnesota to address strategic projects that advance local resilience, equity, and sustainability.

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# Best Practices for Car-Sharing in a Suburban Environment

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Figure 4:



Figure 5:



When considering which service model may work best for a first-ring suburb like Edina, it is important to keep in mind how the city's infrastructure and population density may impact a potential car-sharing program. For a free-floating service model to be practically functional, there needs to be a density of seven charging stations per square kilometer, 1500 people per square kilometer, and a city population greater than 100,000. If those requirements are not met, a one way station-based service model is recommended for cities with broad service goals.<sup>17</sup> If the

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<sup>17</sup> Bernard, Marie R., and Nicholas, Michael. "Success Factors for Electric Carsharing."





## Case Studies

Looking at the different car-sharing models, patterns emerge regarding those that work best in suburban areas. Models with lower capital and operating costs are most effective in typical suburban environments. Managed car sharing in suburbs is often focused on nodes that generate large numbers of trips.

Mobility hubs have proven to be successful places for car sharing in examples from Germany, Illinois, California, and Oregon. In these examples, mobility hubs have been placed near public transit stops and offer a range of options for users to complete their trip. Car share, ride share, bike share, and scooter share are paired with more dense development to help solve first/last mile problems for transit users. Mobility hubs work better when the transit and mobility hub features are paired on the same fare system. Success has been observed in areas that are walkable, safe for bicyclists, and have high parking costs. In these examples, a managed hub-based system is used to operate the car share. This model provides a high level of service while also keeping operating costs lower.

Providing car share in multifamily development projects is another model seen in the Twin Cities<sup>23</sup> and Vancouver. This model partners the car share provider with developers who provide spaces for car share. The developer can advertise the system as an amenity and, with a flexible zoning code in place, can request that some zoning requirements (for example, minimum off-street parking requirements) be waived to lower their project cost. These systems require less maintenance by the car-share provider because each trip must start and end at the apartment's car-share hub.

Car share has become an option in suburban communities with colleges and universities in Maryland,<sup>24</sup> New Jersey,<sup>25</sup> and North Carolina.<sup>26, 27</sup> Car sharing in these circumstances provides a mobility option for the large proportion of college students who do not own a car. This is a valuable service in areas with low walkability and bikeability for students to complete daily tasks. The team was unable to find research specifically on a school setting for car share, but many implementations of hubs have occurred at suburban colleges or universities.

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<sup>23</sup> <https://hourcar.org/multifamily/>

<sup>24</sup> "Carshare (Zipcar)." *UMD DOTs*, University of Maryland, <https://transportation.umd.edu/sustainable-transportation/carshare-zipcar>.

<sup>25</sup> "Rutgers University Car Share." *Zipcar*, Zipcar, <https://www.zipcar.com/universities/rutgers-university>.

<sup>26</sup> Cmsadmin. "Zippy Campus Additions." *Inside UNC Charlotte*, UNC Charlotte, 25 Apr. 2019, <https://inside.charlotte.edu/newsletter-stories/zippy-campus-additions>.

<sup>27</sup> "Shared Mobility Mapping Tool." *SUMC | Mapping Shared Mobility*, Shared Use Mobility Center, <http://maps.sharedusemobilitycenter.org/sumc/>.

Peer-to-peer car-sharing examples have also found success in low-density and low-connectivity areas. These models are low maintenance as most work is done by the car owner.<sup>28</sup> This system has seen widespread adoption in more locations than the examples above. Peer-to-peer car-sharing can provide alternative income streams for car owners during the large swaths of time their vehicles remain parked. This system is already being used by Edina residents across the city.

### *California Bay Area*

The California Bay Area suburbs provide a case study of a car-share system that initially failed, but which has become more stable during the past decade. An original car-share pilot in the early 2000s partnered with employers to help solve the first/last mile problem of employees traveling by Caltrains to Silicon Valley and by BART to Dublin-Pleasanton and Livermore Stations.<sup>29</sup> This system was phased out in 2004, but it showed that demand for car share was there with proper buildout. Zipcar began operation of a round-trip car-share program in 2005 in San Francisco.<sup>30</sup> Since then, the company has expanded hubs to many suburban communities in the area. Car-share hubs in suburban Bay Area communities tend to be at transit line stops, often as a component of larger neighborhood or regional mobility hubs. Car-share hubs are also located in destination districts of some Bay Area suburbs. The locations of these hubs tend to be well connected, bikeable, walkable, and have a high density of trip generators, such as employment or retail centers. Hubs are built around locations with anchor tenants that will provide stable baseline usage of the system. This Bay Area system has found a degree of stability in the market as it approaches two decades in operation, and underscores the careful consideration of location necessary in lower density suburban environments to ensure a viable system.

### *Portland Metro Suburbs*

The Portland Metro car share system is entirely based along light-rail-transit lines in the suburbs. Some stations west of Portland on the MAX Blue Line have maintained hub-based round-trip car share through Zipcar. This system takes advantage of large transit hubs located in Beaverton and transit-oriented development at other stations. The hubs near transit-oriented

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<sup>28</sup> Shaheen, Susan A., et al. "Personal Vehicle Sharing Services in North America." *Research in Transportation Business & Management*, vol. 3, 2012, pp. 71–81., <https://doi.org/10.1016/j.rtbm.2012.04.005>.

<sup>29</sup> Shaheen, Susan A., and Caroline J. Rodier. "Travel Effects of a Suburban Commuter Carsharing Service." *Transportation Research Record: Journal of the Transportation Research Board*, vol. 1927, no. 1, 2005, pp. 182–188., <https://doi.org/10.1177/0361198105192700121>.

<sup>30</sup> United States, Congress, Climate Initiatives Program. *Bay Area Carsharing Implementation Strategy*, Metropolitan Transportation Commission, Feb. 2018. [https://live-sumclearingcenter.pantheonsite.io/wp-content/uploads/MTC-carsharing\\_report\\_vfinal\\_06.21.18.pdf](https://live-sumclearingcenter.pantheonsite.io/wp-content/uploads/MTC-carsharing_report_vfinal_06.21.18.pdf).

development have much higher walk, transit, and bike mode shares than the region as a whole.<sup>31</sup> Usage of car share at transit-oriented development sites increased from 2% of residents in 2005 to 19% in 2019, which underscores the promise in locations with good multi-modal connectivity.<sup>32</sup> Other car-share providers such as ReachNow attempted to implement car share at major suburban corporate employers such as Tektronix in Beaverton.<sup>33</sup> Their implementation was short lived as ReachNow ceased operations in 2019, making unclear the long-term feasibility of car share away from transit stations in the region.<sup>34</sup>

### *Northeast Suburbs*

Suburbs of northeastern metropolitan areas have followed similar models for car share. Hubs are located near transit stops or near major destinations with environments friendly to walking and biking. In New Jersey, placing mobility hubs near transit centers has been successful. It has expanded in towns with education institutions like New Brunswick and Princeton for greater use by students who may not own a vehicle.<sup>35</sup> Boston suburbs have seen success using transit stations as the backbone of their systems while providing car share hubs near commercial, educational and employment hubs.<sup>36</sup> Most of these car share hubs are in streetcar suburbs which were developed in a similar period to parts of Edina with similar development characteristics.

### *Metro Vancouver Apartments*

Suburbs of Vancouver, British Columbia have found success partnering with apartment developers to create hub-based round trip car share programs within housing developments. Zoning changes were enacted to reduce parking requirements for developers who added car share

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<sup>31</sup> McNeil, Nathan, and Jennifer Dill. "Revisiting Tods: How Subsequent Development Affects the Travel Behavior of Residents in Existing Transit-Oriented Developments." 2020, <https://doi.org/10.15760/trec.250>.

<sup>32</sup> Dill, Jennifer, and Nathan McNeil. "Transit and Active Transportation Use for Non-Commute Travel among Portland Transit-Oriented Development Residents." *Transportation Research Record: Journal of the Transportation Research Board*, 2022, p. 036119812210983., <https://doi.org/10.1177/03611981221098391>.

<sup>33</sup> Njus, Elliot. "Car-Sharing in Portland: Driver's Guide to Options in a Growing Market." *The Oregonian*, 15 Sept. 2016.

<sup>34</sup> Nickelsburg, Monica. "Inside the Abrupt Shutdown of BMW's ReachNow Car-Sharing Service in Seattle and Portland." *GeekWire*, 6 Aug. 2019, <https://www.geekwire.com/2019/inside-abrupt-shutdown-bmws-reachnow-car-sharing-service-seattle-portland/>.

<sup>35</sup> Staub, Tim, and Stephanie DiPetrillo. "Car-Sharing a Reality in New Jersey." *NJTOD.org*, Alan M. Voorhees Transportation Center, 17 Aug. 2018, <http://www.njtod.org/car-sharing-a-reality-in-new-jersey/>.

<sup>36</sup> Hanson, Melissa. "Zipcar Launches Six-Car Fleet in Worcester." *Masslive*, Masslive, 29 June 2017, [https://www.masslive.com/news/worcester/2017/06/zipcar\\_launches\\_in\\_worcester\\_j.html](https://www.masslive.com/news/worcester/2017/06/zipcar_launches_in_worcester_j.html).

options. Developers are able to save money on parking while providing an amenity for tenants.<sup>37</sup> Higher parking requirements have been shown to increase rents due to the high cost associated with constructing parking facilities.<sup>38</sup> For cities, this does not lead to parking issues when updated requirements match studied decreases in car ownership for populations with car share access.<sup>39</sup> A research-based change in zoning requirements can decrease costs for developers and renters while also providing car share to those living nearby the apartment.

The range of options existing in suburban environments tend to be more targeted and curated for specific user groups. The areas where traditional car share exists tend to be historic cores, high density or connected to transit systems. The smaller areas in traditional suburbs that feature these characteristics have seen investment in carshare services. Outside of these targeted cases, peer-to-peer car-sharing works for areas with low density and connectivity. Matching the car share system to neighborhood characteristics will be important when implementing a network in Edina.

## Existing Services within Twin Cities

When considering best practices for a suburban car-sharing program, it is important to recognize how such a system may fit within the existing transportation ecosystem in that area. Edina is a first-ring suburb of Minneapolis and is located centrally within the Twin Cities Metropolitan area. While much of the region outside of the urban core of Minneapolis and Saint Paul remains car-dependent, owning a personal vehicle is no longer the only way to move about the city.

### Hourcar

Car-sharing services have existed in the Twin Cities for well over a decade, but have exploded in popularity in recent years as people began to explore alternative transportation modes. Car2go was the first car-sharing service to garner significant attention in the region. It was operated primarily using a free-floating model and was popular among residents.

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<sup>37</sup> Canada, Metro Vancouver, Metropolitan Planning, Environment, and Parks. *The Metro Vancouver Apartment Parking Study: Revised Technical Report*. [https://www2.gov.bc.ca/assets/gov/housing-and-tenancy/tools-for-government/uploads/metro\\_apartment\\_parking\\_study\\_technical\\_report.pdf](https://www2.gov.bc.ca/assets/gov/housing-and-tenancy/tools-for-government/uploads/metro_apartment_parking_study_technical_report.pdf)

<sup>38</sup> Gabbe, C. J., and Gregory Pierce. "Hidden Costs and Deadweight Losses: Bundled Parking and Residential Rents in the Metropolitan United States." *Housing Policy Debate*, vol. 27, no. 2, 2016, pp. 217–229., <https://doi.org/10.1080/10511482.2016.1205647>.

<sup>39</sup> IBI Group. *Parking Standards Review: Examination of Potential Options and Impacts of Car Share Programs on Parking Standards*. City of Toronto, <https://www.urbandb.com/document/ibi-group-parking-standards-review-examination-of-potential-options-and-impacts-of-car-share-programs-on-par...-2009-03-01.pdf>.

Membership numbers grew to nearly 30,000 for the service, while the company maintained 400 vehicles throughout the Twin Cities. After a three-year stint, Car2go pulled all operations in 2016, citing high taxes for rental vehicles.<sup>40</sup>

HOURCAR has operated in Minneapolis and Saint Paul since 2005, and is the primary car-sharing service for the Twin Cities today. After becoming a fully-independent nonprofit organization in 2017, HOURCAR focused its mission to "connect people to their communities with convenient, equitable, and sustainable multimodal transportation."<sup>41</sup> Since then, they have operated a hub-based model in neighborhoods across Minneapolis and Saint Paul, now featuring a fleet of 50 vehicles.

## Evie

In February 2022, HOURCAR, in partnership with the cities of Minneapolis and Saint Paul, Xcel Energy and others, launched the EV Spot Network, a series of 70 renewably-powered curbside EV Spot Charging locations alongside its new all-electric car-sharing service called Evie. It is a free-floating service in a home area covering 35 square miles of Minneapolis and Saint Paul. Today, Evie operates over 150 all-electric vehicles for the car-sharing program.

In the first six months of Evie, nearly 25,000 trips were logged totaling almost 250,000 miles reducing greenhouse gas emissions and transportation costs for area residents.<sup>42</sup> By 2024, HOURCAR plans to offer nearly 100 vehicles under the HOURCAR name, while they anticipate operations to exceed 170 electric vehicles under the Evie Carshare name.

## Multifamily Project

Most recently, HOURCAR launched the Multifamily Project in August 2022, which brings hub-based electric-vehicle access to multifamily housing complexes around the metropolitan area, particularly at affordable housing sites and in areas that have been traditionally underserved. Will Shroeer, a board member at HOURCAR, and executive director of East Metro Strong, discussed the program, and its expansion.<sup>43</sup> The project aims to provide

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<sup>40</sup> Hansen, H. (2016, November 18). *All those little Car2go cars will disappear by year's end. Here's why*. Twin Cities Pioneer Press. Retrieved December 12, 2022, from <https://www.twincities.com/2016/11/18/car2go-to-suspend-service-in-twin-cities-by-the-end-of-year/>

<sup>41</sup> HOURCAR. (2022). *About Us*. HOURCAR. Retrieved December 10, 2022, from <https://hourcar.org/about/>

<sup>42</sup> HOURCAR. (2022, September 12). *First 6 months of Evie Carshare*. Evie Carshare. Retrieved December 10, 2022, from <https://eviecarshare.com/wp-content/uploads/2022/10/2022-Evie-6-Month-Report-RFS-FINAL.pdf>

<sup>43</sup> Interview with Will Shroeer, 11/22/2022. Available upon request.

additional transportation options to those most in need while breaking down barriers to building EV charging infrastructure at multifamily housing.<sup>44</sup>

## Recommendations & Conclusions

Throughout this report, we have examined different models of car share. One of the key findings is that carshare is a system that depends on the local environment and demographics. For a free-floating system to be operable, there needs to be enough density in its service area to match the demand required to maintain the system. A suburb like Edina would instead be best served with a specific, targeted treatment. There needs to be careful planning and analysis about who the target demographic is specifically, and what kinds of trips are being targeted.

The first option, that covers the bulk of this report, is a carshare system. It is important to be realistic about the use cases of a carshare system. If someone already has a private car, they are less likely to pay extra to rent a car. People who use carshare systems usually do not feel ownership over the cars they drive<sup>45</sup>. This team would recommend strategically placed round-trip carshare hubs at specific locations in the community. The vehicles should be placed so the people who live in proximity to the car can use it like a private car they drive to and from their homes. This means putting vehicles at multifamily developments which may increase perceived ownership of the shared vehicle.

Additionally, we recommend mobility hubs at transit stations to facilitate last and first mile access, which generate significant carshare use<sup>46</sup>. This enables people to use the transit system for more kinds of trips. For example, if someone from the city wishes to visit with friends or family in Edina or needs to attend a pressing work event, then the addition of a car to use on the last leg of their journey means that transit could serve as a more fast, reliable, and viable option.

There are two additional options for Edina to consider to reduce the incidence of single-occupant vehicle trips. The first is a carpool system, which has been effective at reducing SOV trips.<sup>47</sup> The city can facilitate a system to safely match drivers and riders, perform public outreach, and offer financial incentives. Another option is a vanpool/demand-responsive transit

<sup>44</sup> HOURCAR. (2022). *Multifamily EV Carshare Pilot Program*. HOURCAR. Retrieved December 10, 2022, from <https://hourcar.org/multifamily/>

<sup>45</sup> Fleura Bardhi, Giana M. Eckhardt, Access-Based Consumption: The Case of Car Sharing, *Journal of Consumer Research*, Volume 39, Issue 4, 1 December 2012, Pages 881–898, <https://doi.org/10.1086/666376>

<sup>46</sup> Efthymiou, Dimitrios, et al. "Factors Affecting the Adoption of Vehicle Sharing Systems by Young Drivers." *Transport Policy*, vol. 29, 2013, pp. 64–73., <https://doi.org/10.1016/j.tranpol.2013.04.009>.

<sup>47</sup> Metrolinx, Toronto, Ontario, 2016, *SMART COMMUTE - NORTH TORONTO, VAUGHAN*.

system. This system could have a few vans that are specific to the Edina area to serve trips between final trip origins and destinations and high-frequency transit stations. A dynamic ridesourcing pickup system that allows users to request a ride with a shuttle service pickup may reduce SOV vehicle-miles traveled.

We have seen many different examples of car-sharing, most of which show that it is most effective in dense, well connected areas. There are examples of successful car-sharing systems in low density areas near transit connections. Targeted approaches, like the Multifamily carshare we discussed with Hourcar's Will Schroer, may be highly effective at reducing SOV trips. Both recommendations for Edina are targeted round-trip carshare systems which best match the density and development patterns of Edina. The ongoing electrification of the transportation system and the buildout of new transit lines highlights the opportunity for an effective car-sharing system. A vehicle sharing system is a valuable next step to help Edina meet its climate goals and reach towards provision of a sustainable transportation system that does not burn upwards of 30 million gallons of poisonous fossil fuels<sup>48</sup>.

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<sup>48</sup> City of Edina, Edina, MN, 2021, *Community Greenhouse Gas Inventory*.




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