

**Evaluating Transportation Use and Carsharing Potential on a College Campus**

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**Case Study**

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**SUNY Environmental Science and Forestry, Syracuse, NY**

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## **INTRODUCTION**

Given the high cost of maintaining a personal vehicle on a college campus, a number the College Board places at approximately \$5,800 per year, alternative transportation arrangements have the potential to reduce the overall costs of mobility. Moving away from a reliance on personal vehicles could save on parking space, the environment, and money. Modifying vehicle use to share or delay the purchase of new single-occupant vehicles has the potential to be doubly beneficial for the environment. The Transportation GHG Emissions Report of the Environmental Protection Agency (EPA) found that transportation accounted for 27% of greenhouse gas emissions in the US as of 2003, of which 62% came from “light-duty” (personal) vehicles. Honda estimates that 810kg of CO<sub>2</sub> are released during the manufacturing process for each new car.

This report will analyze the patterns of transportation use at SUNY Environmental Science and Forestry (ESF), an institution of 3,000 students, staff, and faculty in Syracuse, New York.

The ESF campus is served by a bus system and shuttle service. It includes accommodations for bicycles, as well as on-campus parking. Given the proximity to campus, and environmental consciousness of students, walking and bicycling are popular transport options. For those that must commute to campus by car, parking is a commodity often in short supply. Those that rely on other modes lack the flexibility of a personal vehicle.

CuseCar, a 501(c)3 non-profit community carsharing organization serving the City of Syracuse, aims to fill this flexibility gap, allowing non-owners to have access to a vehicle, when needed.

The carsharing concept consists of a flexible fleet of vehicles shared between members’ group and paid for on a per-mile or per-hour basis. The concept of used began in the 1980s in Switzerland and across Europe, and has only spread to the United States within the last decade. Recent advances in technology, especially the internet, remote access, and remote communications, have decreased the associated costs of applying the carsharing model. Users tend to drive less, own fewer cars, and utilize public transit.

The Madison Environmental Group in its carsharing feasibility report identified low rates of auto-based commuting, fewer vehicles per household, high household density, and a low percentage of those between the ages of 16 and 24 as major factors in the success of carsharing. Apart from the age limit, all of the following conditions could be met by the ESF community.

ESF has been an early supporter of the CuseCar carsharing organization, sponsoring a car located on campus for use by students and staff. Gauging the suitability of carsharing to the university context requires insight into the transportation trends on campus. Furthermore, adapting the CuseCar program to suit the campus would benefit from an understanding of constituents' reactions to and comprehension of the carsharing concept.

## **SURVEY**

### **Overview**

The survey was designed over the months of January and February and administered from February 13 through March 11, 2009. ESF is a campus of approximately 3000 students and staff, of which the breakdown is as follows:

*Table 2.1 – Campus demographics*

<i>Type</i>	<i>Percentage</i>		<i>Population</i>
Undergraduate students	65.1%	82.5%	1946
Graduate students	17.4%		521
Staff and faculty	17.5%		523
Total	100%		2990

In all, 248 of 285 respondents completed the survey (87%). Those that did not finish likely were stymied by the online survey layout.<sup>1</sup> Of those that responded, approximately half were undergraduate students, with the remaining amount split between graduate students and staff. Undergraduates were underrepresented, while graduate students and staff were over-represented. Response rate has been derived using survey and campus population. In all, student representation in the survey is close to the correct proportion on campus.

*Table 2.2 – Survey responses*

<i>Type</i>	<i>Percentage</i>		<i>Response Count</i>	<i>Response Rate</i>
Undergraduate student	50.9%	73.4%	145	7.5%
Graduate student	22.5%		64	12.2%
Staff member	23.9%		68	13.0%
Community resident	0.4%		1	--
Other	2.5%		7	--
Total	100%		285	9.5%

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<sup>1</sup> See *Sources of Error*.



## **Methodology**

The survey was designed on paper, then typed and circulated for feedback, both through email and in person to:

Michael Kelleher, Director of Renewable Energy Systems, SUNY ESF

Vita DiMarchi, Executive Director, CuseCar

Sarah Roberts, Director of Business Development and Marketing, CuseCar

The final product was adapted to fit the format of SurveyMonkey.com, an internet-based survey tool. Only minimal changes were made in the process of adding the survey questions to the SurveyMonkey Professional account. Questions types included:

Ordered list

Multi-selection (check box)

Numerical entry

Rating (scaled)

Text entry (comments)

When at all possible, attempts were made to include an “Other” option, either for purposes of elaboration, or to allow respondents to add an answer they did not see listed. Such a strategy is an attempt to correct any oversight in the design process, and to encourage unsure respondents to continue with the survey.

As a preliminary test, the survey was administered to a handful of graduate students in Environmental Studies, which resulted in improvements to a number of questions. Once tested and signed off on by Michael Kelleher and the CuseCar team, the email was sent to the campus-wide student listserv. Mr. Kelleher sent the same message to the staff and faculty listserv. Both emails together reached approximately 3,000 people in all.

## **RESULTS**

### **Staff**

Students make up approximately 65% of the campus population, yet accounted for slightly over half of the total responses. Staff and faculty accounted for a slightly higher percentage of respondents than their representation on campus. Coupled with the higher propensity for staff and faculty to commute to campus, and the different patterns of transport use outside the immediate university area, the overall results are skewed towards those with personal vehicles and long commutes to campus.

Among staff, 41% live off campus and over half (52%) live outside Syracuse. Of 68 respondents, all 68 used a car to commute to campus, though some also chose to bike, walk, or bus on occasion. The average commute for staff is 13.4 miles. Since the main purpose of this survey is to measure transportation patterns on and around campus, staff has been excluded from the in-depth analysis.

### ***Students***

#### *About You and Transport*

Of student respondents, 47.1% have a car, 39.9% do not have a car, 9.4% left their car at home, and 2.9% share a vehicle. Approximately 80% of students have a valid license, and have been driving for an average of 5.6 years. When undergraduate and graduate students are compared, a much higher percentage of grads have a vehicle. This may reflect age or expected income, or it may be a reflection of a difference in average distance from campus.

*Table 3.1 – Do you have a car?*

<i>Response</i>	<i>Undergraduate students</i>	<i>Graduate students</i>
Yes	42.1%	<b>64.1%</b>
No	<b>44.1%</b>	23.4%
Shared	2.1%	4.7%
Yes, but not here (at home)	10.3%	6.3%

Other	1.4%	1.6%
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Walking is the most common form of transport, with 11.8 trips weekly. Cars are second, at 5.0 trips, followed by bus (3.4) and bike (2.5). Most students commute to work or class on foot (71%), followed by car (38%), bus (33%), and bike (23%), the same order of importance as above. Students may use more than one mode of transport, and were allowed to select more than one answer, leading to a total exceeding 100%.

Commuting without a personal vehicle is an indicator of carsharing success. Those that must use a car daily are effectively “locked in” and have little need for alternatives, but those that do not may be searching for a more effective solution. While 42% of undergrads and 64% of grad students have a vehicle, only 38% commute to campus by car. Given that the majority of students are able to walk to class, and choose to do over using a vehicle, they are a prime market to adopt carsharing.

The average daily commute for students is 3.67 miles, one way, an average skewed by a handful of very large answers. Most responses were between 1 and 3 miles. However, the average commute was significantly longer for grad students.

*Table 3.2 – What is the average distance of your daily commute (one-way)?*

	Undergraduate students	Graduate students
Distance (in miles)	2.41	8.27

When traveling to off-campus activities, 82% travel by car, and exactly 50% on foot, followed by bus (36%) and bike (21%). This high percentage of car use, vastly exceeding car ownership, implies a significant target market for carsharing.

Between on- and off-campus activities, there is a marked increase, more than double, in car travel, accompanied by a significant drop in travel on foot. The 83% of students that travel off-campus by car approaches the 85% of students with valid drivers’ licenses.

Students tend to leave the campus on the weekend in almost equal numbers for shopping, groceries, recreation, restaurants, and visiting friends and family. During the week, only grocery shopping does not drop by the 40-50% rate seen in other activities. Carsharing, which is a by-the-hour service, works best for such short-duration trips.

### *Carsharing*

Over 77% of respondents have heard of carsharing, mainly through friends and family (33%). In order of importance, news and fliers are followed by website, all above 20%, trailed by TV (13%), and followed distantly by events, web searches, and members. Word-of-mouth was most significant for transmitting the carsharing concept.

When asked if carsharing was something “that you would possibly make use of,” a slight majority (43%) said maybe, followed by yes (37%), then no (20%). Considering 40% of respondents have a personal car, this may signal that students are at least envisioning alternatives.

When ranking priorities, money and availability issues reigned. Per-hour price was far and away the most important priority, followed by availability and signup cost. Students are shown to be particularly price-sensitive, and would be making the decision to sign up and utilize car sharing on largely economic grounds. In the student environment, a refined pricing structure, which was not tested explicitly in this survey, should be of utmost importance. Community pride was the most contentious issue, with 30.7% rating it as not important and 35.4% rating it as either important or very important.

*Table 3.3 – How important are the following priorities?*

<i>Priority</i>	<i>Rating Average</i>	<i>Very Important (%)</i>
Price per hour	3.59	66.4%
Availability	3.51	55.9%
Signup cost	3.37	51.6%
Location	3.32	43.8%
Helping the environment / Keeping cars off the road	3.29	48.0%

Features	2.23	9.6%
Community Pride	2.21	15.7%

*CuseCar*

On-campus fliers were the most common source of information about CuseCar (32%), followed by news, website, friends or family, and other, all around 20%. Approximately 20% of respondents had not heard of CuseCar. Of those that specified where they had heard of CuseCar, campus-wide email was by far the most frequent response.

When asked about CuseCar features, those aspects more closely related to economics and hassle were most popular, led by included insurance. Parking was a distant yet significant second, followed closely by paying for gas as a concern. Interest in these CuseCar features may mirror general problems with owning a personal vehicle on or around campus.

*Table 3.4 – How important are the following CuseCar features?*

<i>Priority</i>	<i>Rating Average</i>	<i>Very Important (%)</i>
Insurance included	3.66	69.3%
Dedicated parking	3.23	42.4%
Never pay for gas	3.19	46.4%
Online reservation system	3.18	35.4%
Hybrid technology	3.08	35.1%
Commitment to ESF and surrounding neighborhoods	3.02	33.9%
Member “Go-to” savings at local establishments	2.54	16.3%
Member support	2.21	9.9%

"Go-to" is a CuseCar membership program which gives savings at green, local, and sustainable establishments. Approximately half of respondents were interested in grocery, dining, and entertainment. Interestingly, 15.9% of students labeled Go-Grocery as “Enough to make me join (VERY interested)”.

Focusing on partnerships with grocery establishments such as the Syracuse Real Food Co-op, a write-in favorite, might boost the selling potential of CuseCar. Other suggestions for discounts that would encourage students to join included Wegmans, Onondaga County Parks, skiing, and Doc’s Little Gem Diner.

Of features to be considered for the future, full-day rental discounts and cutting-edge alternative fuel vehicles were most popular. Currently, the CuseCar program has plans to add a compressed natural gas (CNG) vehicle, the Honda Civic GX, to its active fleet.

When asked whether they would prefer a community-based non-profit or a national for-profit carsharing organization, 70.6% of respondents chose non-profit, while 22.7% considered it not a factor. Write-in comments suggested that price and proper management were most important factors.

### *Locations and Usage*

Supporting previous evidence that staff members live too far from campus and would tend to skew the results, over half of staff identified as living outside Syracuse. Apart from this question, staff results have been omitted from this section of the survey. The vast majority of graduate students live off-campus, yet within city limits. Undergraduate students are more evenly split, with approximately one-third on campus, and two-thirds elsewhere.

*Table 3.5 – Where respondents live right now*

<i>Location</i>	<i>Undergraduate</i>	<i>Graduate</i>	<i>Staff</i>
On-campus	36.9%	3.4%	0.0%
Off-campus	<b>58.5%</b>	<b>84.7%</b>	41.1%
Outside Syracuse	3.8%	11.9%	<b>51.8%</b>
Other	0.8%	0.0%	7.1%

Interestingly, students are evenly split between preferring an on-campus or off-campus location for the vehicles. This may reflect an uncertainty over whether share vehicles would be similarly accessible if sited off-campus. Of those students that responded, approximately 25% live in the Westcott neighborhood, 19% live in the University Neighborhood, 14% live on University Hill, and 8.5% live in the Outer Comstock area. No student selected Downtown, where the additional CuseCar fleet vehicles are currently located, as his or her neighborhood.

When asked who would be paying for a carsharing membership, 86% said themselves, while 13% said their parents or family would foot the bill. Average length of trip, in hours, across all students, was 3.61. This number compares favorably to the industry-standard 3- to 4-hour reservation.

Given that cutting-edge vehicles and hybrid engine technology ranked highly in previous questions, it may make sense that respondents were willing to pay a premium to use a hybrid. Slightly less than 60% of students would pay \$1-2 more, while 11% would pay \$3-5 more. Only 27% of those students surveyed would not pay any extra amount.

### **Final Thoughts**

While most respondents did not know if they would now sign up for the CuseCar program, a significant minority of students on campus showed some interest. If the percentage of each group which agreed it would now sign up for CuseCar is weighted according to the campus population, a total potential user base of 454 students and staff is arrived at.

*Table 4.1 – Would you sign up for CuseCar, knowing what you know now?*

<i>Status</i>	<i>Yes (%)</i>	<i>Population (weighted)</i>
Undergraduate students	17.6%	342
Graduate students	19.6%	102
Staff	1.9%	10
Total	15.2%	454

For a campus of only 3000 people, this user base seems high. However, education, familiarity, and awareness may be the biggest obstacles remaining to carsharing adoption. As time progresses and the concept becomes more well-known, especially among the incoming undergraduate classes which form the bulk of the campus community, the idea may yet catch on in full force.

## **CONCLUSION**

### **Sources of Error**

The process of designing a survey rarely translates itself directly to an online form. Such was the case with SurveyMonkey.com. After designing and sending out the survey, a number of respondents wrote back to mention difficulty finishing the first section of the survey. Ultimately, the source of the error was a numerical entry box. Such boxes only allow single digit numbers, not decimals, and when a respondent attempted to enter a fraction of a whole, the survey would not proceed. Having fixed this problem would likely have significantly raised the 87% completion rate.

Additionally, answers which required multiple entries per question, with some reading as 0 or null, may have caused some distortion. When a respondent left a space blank, instead of factoring in a 0 to the average, it simply left that box out of the calculation. As a result, “trips by car”, for example, may only be representative of those that already own or use a car.

If any bias exists, it may be in the self-selecting nature of an online survey. Those that had no familiarity whatsoever with the carsharing concept, or felt that their input was not useful because they lived too far away from campus, could have chosen to not answer the survey. However, given that one-quarter or more of the respondents identified as never having heard of the carsharing concept prior to this survey, this self-selection may not exist.

### **Summary**

Carsharing has the potential to help ease concerns related to personal vehicle use, including parking, economic cost, and environmental impact. While the most common form of transportation for students traveling to and from campus is on foot, car, bus, and bike all figure prominently. Approximately 40% of undergrads and 60% of graduate students have a vehicle, though together only 38% commute to work or school by car. For those looking to survive without a vehicle, carsharing could be a possible compromise. Among staff, whose average commute is over 12 miles, each way, 100% use a personal vehicle to commute to work, though a small fraction utilizes other modes.

Given the comparatively low car use by undergrad and grad students, they would be an ideal market for expanding the CuseCar user base. Of those that have no car, approximately 62% have a valid license. Established carsharing organizations generally have from 15-40 users per vehicle, with 30 or more needed to reach a critical mass, according to the Victoria Transport Policy Institute's Transport Demand Encyclopedia. If only 10% of this market were captured, compared with the approximately 18% of students which stated interest in the survey, the benefits would be more than enough to support the single CuseCar vehicle on campus.

$$2467 \text{ Total Students} \times 37.8\% \text{ No Car} \times 62.0\% \text{ Valid License} = 578 \text{ Students}$$

Similarly, only 38% of students commute to campus by car, while 84% of the overall student population holds a license. In this case, approximately 1300 students might be willing to try carsharing, if the price were right. A mere 10% of this market would be enough to support 3-4 vehicles, at the rate of 30+ users per vehicle.

$$2467 \text{ Total Students} \times 62.2\% \text{ No Car Commute} \times 84.2\% \text{ Valid License} = 1292 \text{ Students}$$

Success in courting new members will depend greatly on the right balance between price and availability. Per-hour rate and availability of vehicles were the main concerns of students. A majority (~60%) stated they would pay \$1-2 more for a hybrid vehicle. However, since pricing structure was not surveyed, there is no way of knowing for sure how the overall price level might

affect the propensity to sign up and use the service on a regular basis. Further testing and surveying may be necessary to determine an attractive yet sustainable signup and per-hour cost.

As membership grows, successful user experiences will help spread the word about CuseCar. Around 20% of those surveyed heard about CuseCar, and 30% about the carsharing concept, from friends or family. Name recognition and an understanding of the concept is the first step in gaining new members. On a positive note, a full 80% of student respondents had heard of CuseCar.

Transportation and car use trends on campus show some promise for adoption of alternative options. CuseCar is widely known on campus, if not fully understood, and a significant portion of those surveyed showed some interest in signing up for the program. More marketing, especially through email and word-of-mouth, a refining of the price and availability structure, and a specific focus on students and those likely to make use of CuseCar are the keys to future success in the campus market.

## **APPENDICES**

### **Campus-wide survey email**

The following email was sent to the campus community through the general student listserv on February 20, 2009.

#### **From the Office of Renewable Energy Systems**

Kyle Bell is an ESF graduate student working on a survey to gauge interest in the CuseCar program that recently launched on the ESF campus. CuseCar is a nonprofit community carsharing program that provides a vehicle by the hour for student/staff/faculty use, and includes gas, insurance, and upkeep, all at a fixed price. The CuseCar is a Toyota Prius parked on campus and available by online reservation.

We need feedback about how people move about and what they would like to see in car sharing programs. Your feedback will help us in that process.

You can reach the survey at the following address:

[http://www.surveymonkey.com/s.aspx?sm=0Uaql6zukUjBZ\\_2fDeGXoGiQ\\_3d\\_3d](http://www.surveymonkey.com/s.aspx?sm=0Uaql6zukUjBZ_2fDeGXoGiQ_3d_3d)

The more responses I get, the happier I will be, so thanks for your help in advance.

Sincerely,

Kyle

M.S., Environmental Studies, SUNY ESF  
MPA, Maxwell School, Syracuse University

### **Campus-wide survey email follow-up**

In order to reach those students that did not respond to the first email, a second notice was sent on March 3, 2009. The second time around, a note was made in the email itself of the small gift available for those that finished the survey. Additionally, a reminder was added for respondents to answer all questions.

Subject: CuseCar survey reminder, closing shortly

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For your help, there is a special discount at the end, as well as a small gift. If questions are skipped, or you have an old browser, the quiz may not advance to the second page.

The survey will be closing Sunday, March 8, so this is the last week to fill it out, if you haven't done so already. The more responses we get, the happier I will be, so thanks for your help in advance.

Sincerely,

Kyle

M.S., Environmental Studies, SUNY ESF  
MPA, Maxwell School, Syracuse University

## **ADDITIONAL RESOURCES**

The following is only a partial list of the resources available on the subject of carsharing. It is, however, an attempt to capture the breadth of the literature on community carsharing implementation in the U.S. context. For the foremost authors, contact information has been included, when available.

Andrew, James ([james.andrew@metc.state.mn.us](mailto:james.andrew@metc.state.mn.us)), and Frank Douma, Developing a Model for Car Sharing Potential in Twin Cities Neighborhoods, Univ. of Minnesota (2006)

Bringing car-sharing to your community. City CarShare. Retrieved January 2009 from [http://www.citycarshare.org/download/CCS\\_BCCTYC\\_Long.pdf](http://www.citycarshare.org/download/CCS_BCCTYC_Long.pdf).

Brook, David ([dbrook@easystreet.com](mailto:dbrook@easystreet.com)). (2004). Carsharing – start up issues and new operational models. TRB.

Burkhardt, J. E., & Millard-Ball, A. (2006). Who is attracted to carsharing?

Cohen, Adam (TSRC), Susan Shaheen (TSRC), and Ryan McKenzie (CityWheels). (2008). Carsharing: a guide for local planners. PASMOMO. American Planning Association.

Flamm, M. (2008). The industrialization of carsharing in Switzerland. [L'industrialisation de l'auto-partage en Suisse] Flux, (72-73), 152-160.

Glötz-Richter, M. (2008). CarSharing as part of transport integration concepts experience of the Bremen mobil.punkt. Public Transport International, 57(2), 30-32.

Grossberg, Rebecca and Sonya Newenhouse, Ph.D. (2002). Community Car: A New Transportation Option for Madison, Wisconsin – Carsharing Feasibility Study. Madison Environmental Group, Inc.

Litman, T. (1999). Evaluating carsharing benefits. Victoria Transport Policy Institute.

Loose, W., Mohr, M., & Nobis, C. (2006). Assessment of the future development of car sharing in Germany and related opportunities. Transport Reviews, 26(3), 365-382.

Millard-Ball, A. ([amillard-ball@nelsonnygaard.com](mailto:amillard-ball@nelsonnygaard.com)), et. al. (2005). Car-sharing: where and how it succeeds. TCRP Report 108. Transportation Research Board.

Morency, C., Trépanier, M., Agard, B., Martin, B., & Quashie, J. (2007). Car sharing system: What transaction datasets reveal on users' behaviors. 284-289.

Nobis, C. (2006). Carsharing as key contribution to multimodal and sustainable mobility behavior: carsharing in Germany.

Ornetzeder, M., Hertwich, E. G., Hubacek, K., Korytarova, K., & Haas, W. (2008). The environmental effect of car-free housing: A case in Vienna. *Ecological Economics*, 65(3), 516-530.

Robert, B. ([communauto@mtl.net](mailto:communauto@mtl.net)). (2000). Developing a car sharing service in a hostile environment: the virtues of pragmatism. CommunAuto.

Shaheen, S. A. ([sashaheen@path.berkeley.edu](mailto:sashaheen@path.berkeley.edu); [sashaheen@ucdavis.edu](mailto:sashaheen@ucdavis.edu)), Meyn, M., Wipyewski, K. ([kamillw@path.berkeley.edu](mailto:kamillw@path.berkeley.edu)). (2003). U.S. shared-use vehicle survey findings: opportunities and obstacles for carsharing & station car growth. TRB.

Shaheen, S. A., & Cohen, A. P. (2007). Growth in worldwide carsharing an international comparison.

Shaheen, S. A., Cohen, A. P., & Roberts, J. D. (2006). Carsharing in North America: market growth, current developments, and future potential.

Smart, M. (2006). Transportation innovations: methods of self assessment for car sharing organizations. *Panorama*. Univ. of Pennsylvania.

Uesugi, K., Mukai, N., & Watanabe, T. (2007). Optimization of vehicle assignment for car sharing system